



FRIDAY, FEB. 17, 1893.

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Contributions.

Clearance Measuring Car.

NEW PHILADELPHIA, O., Feb. 1, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Noting the illustration of the Pennsylvania Railroad clearance measuring car as given in the *Railroad Gazette* of Jan. 20, the position of the template is given as over the truck. Would it not be a better location to place it over the middle of the car, as upon a sharp curve it would strike obstructions that would clear at the ends?

WM. B. HANLON, Engineer C., L. & W. R. R.

The Pennsylvania Railroad Company,
PHILADELPHIA, Feb. 10, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The point raised by Mr. Hanlon had careful consideration before the car was put on the road. Measurements taken to obstructions from the template placed in the middle of the car would be of no value when applied to a car of a different length; and as cars in use at the present time vary in length from 30 to 80 ft., it would be impossible to get measurements that could be put to general use from the template in this position. The degree of curvature would also affect the results equally with the length of car; and if your questioner will consider the car as at work in a double track tunnel he will realize at once that the results would be very unsatisfactory not on the inner track alone, but on the outer track as well.

With the template where it is placed, namely, over the centre of the truck, the results show the true relative positions of the centre line of all rolling stock at that point with the obstructions, and from these the questions arising from the overhang at the middle of a car on the inner side of curves and at the ends of a car on the outer side of curves must be solved with pencil and paper until such time as all cars are built to one pattern, when the templates can be used to better advantage by being located, one at the middle and another at the extreme end of the car.

FRED. WOOD, Asst. Engineer.

Uniformity in Trade Catalogues.

Norfolk & Western Railroad Co.,
ROANOKE, VA., Feb. 9, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Any busy railroad officer knows what a vexatious thing it is to hunt through a miscellaneous mass of catalogues to find reference to some article which he needs, or to hunt up some particular make of tool or appliance he may wish to specify in a requisition.

Catalogues bound and unbound, pamphlets, and loose leaves are sent to us as well as to other possible purchasers in every conceivable shape, size and form, making it a hopeless and almost impossible task to file them, index them, or keep them in any kind of neat, orderly, and easily referred, to manner.

I would like to suggest to our friends in the supply trade and manufacturers generally that if they would get together and agree upon some two or three standard sizes for their catalogues, pamphlets, etc., and choose for such sizes those that could be readily filed in, we will say BB letter cases, or the Amberg file (or if they saw fit to go a step further and get up a standard catalogue file, so much the better), it would save us a

great deal of trouble and annoyance in hunting up catalogues. Those manufacturers or supply men who would do this, and furnish the purchasers with readily accessible and easily found information, would certainly be more apt to get orders and have their catalogues quoted on requisitions, from the fact that busy men will turn to the information they can get at the quickest.

If the supply trade and manufacturers would, as above mentioned, get together and appoint a committee to look into the matter and select suitable sizes, and possibly submit the problem to some of the people who make a business of manufacturing file and index material such as those mentioned above, it is quite likely that they would be able to scheme out a plan that would be of the greatest convenience to all parties concerned, and I feel sure the publishers and printers would be only too glad to join hands with them, as it would reduce the variety of sizes of stock they would have to carry. The filing should be arranged for, if practicable, by both subject matter and name.

R. P. C. S.

Engine Houses.

Nova Scotia Central Railway,
BRIDGEWATER, N. S., Jan. 30, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the number of your paper for Jan. 20 a writer signing himself "Engineer" has an article on roundhouses vs. rectangular structures for engines. Will you ask him how he puts 44 stalls in an ordinary full circle roundhouse of say 300 ft. outer diameter? Also, and more particularly, how he puts say 40 or 44 stalls into a rectangular structure using curves of not less than 285 ft. radius, and a strip of land not over 140 ft. wide? If he will kindly demonstrate this, I am sure he will have done the profession a great favor.

C. O. FASS.

NEW YORK, Feb. 14, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In my book on "Buildings and Structures of American Railroads," published recently by Messrs. John Wiley & Sons, New York, there is a description of a 44-stall engine house at the West Philadelphia shops of the Pennsylvania Railroad, the outer diameter of the house being 300 ft., the width of the house 65 ft. 6 in., and the panel length on the inner circle 12 ft. 3 3/4 in. A description is also contained in the same book of the 44-stall engine house of the same road at Jersey City, N. J., with an outer diameter of 320 ft., the width of the house being 75 ft. 9 in. and the panel length on the inner circle 12 ft. 1/4 in., the excess of the diameter of the house over 300 ft. being due to the increase in the width of the house. There are also other engine houses mentioned which show that a 44-stall house with an outer diameter of 300 ft. is quite usual. The width of land occupied by a segmental house with 300 ft. outer diameter and a 60-ft. turntable is about 185 ft. clear of the running track in front of the house.

On page 197 of the same book will be found a description and plan of an engine house designed for the Lehigh Valley Railroad at Towanda, Pa., in which a limited narrow strip of land, adjacent and parallel to the main tracks of the road is utilized for an engine-house in which the tracks enter the house on an angle of 46 deg. and are placed 13 ft. centres on the square. This building is 63 ft. wide, giving a stall length about 85 ft. With an available stall length of say, 65 ft., the house would be about 50 ft. wide, and the distance required for the tracks to connect into the running track, parallel with the face of the house, using curves with not less than 285 ft. radius, would be in the clear about 95 ft., so that the entire width of land occupied adjacent to the running track in the clear would be 145 ft. By entering the house on a slightly less angle, and introducing, possibly, special switches, this width can be reduced to 140 ft., and probably, even slightly less with other modifications in the design. I consider, therefore, that an engine house can be built on a narrow strip of land adjacent to the main tracks of a railroad, in the form of a parallelogram, with the necessary approaches and no curves with a radius of less than 285 ft., without occupying more than 140 ft. over all in the width of the yard in the clear, outside of the main track.

WALTER G. BERG.

Numbering Car Seats in Europe.

LONDON, Jan. 25, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It seems a pity to destroy the pleasure which must have arisen at the credit given Americans for innovations in the system of car-seat numbering [see *Railroad Gazette*, Jan. 13, page 35], but the fact is the system is just as old as it can be in England. In the days of the stage coach there were numbered seats just as there are now numbered cabins and berths in steamships, and you selected your coach seat. When the Manchester & Liverpool Railway was opened, about 65 years ago, travelers went to the ticket office and selected their seats from a plan of the train and were booked just as they were in the stage coaches; hence the "booking office" of English railways, the term surviving the practice and proving, to an American, the stupid, conservative character of the English; to other people, the ability of the English to utilize anything or everything and adapt existing machinery to fresh uses. Very soon it was found that the numbering system did not fit in

with the large travel between Manchester and Liverpool and it was dropped, the booking office becoming simply a ticket window, and the numbering of seats being relegated to that limbo whence it has been resuscitated as a new invention. The writer has spoken with those who made the journey on the Manchester line with its original system. The numbering only referred to the better class (or classes) of carriages. The third-class carriages in the early days did not have numbered seats, for a very excellent reason—there were no seats.

Possibly in Germany, where five men in semi-martial costume are required to take charge of every passenger who ventures to cross the tracks at a station, there may be time to allot passengers each their own number. I don't want to claim any credit for such a superannuated old system as an English invention, but merely place on record the facts. Why not adopt the English system of reserving a seat? Here it is quite sufficient to leave on your seat a hat, a rug, a two cent paper or a book and your seat will be reserved for you quite as securely as though you had left a \$100 bulldog in charge, and it is only on the rarest occasion that any one transgresses this unwritten law. The system costs nothing and serves its purpose as well as the most cumbersome system of numbering, in fact far better.

I should think it probable that some of the old books could be obtained from the L. & N. W. Ry. Co., who own the original Chatmoos Line of George Stephenson, if such are still in existence, for exhibition at Chicago.

JOHNNY BULL.

[But surely, John, you who have traveled in the United States, know that it is possible to secure a numbered seat several days in advance by telegraph or telephone or any other message to a main or branch office, and that the system is extremely simple. A "semi-martial" ticket clerk writes your name on a diagram of the car, and a "semi-martial" nigger shows you to your seat when you go aboard. There is no increase of working force whatever to carry out this "cumbersome system." Is this not better than going or sending to the station to put a hat-box, or a bundle of rugs and sticks, or a bath-tub in a seat? And do you not remember that the Yankee princes and dukes seldom have valets to send ahead to select seats and secure them by filling them with what properly belongs in the luggage van?—EDITOR RAILROAD GAZETTE.]

Tests of Brake Beams.

CHICAGO, Ill., Feb. 7, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reply to your request for information on the subject of testing brake beams, and concerning the tables of comparative tests published in your issues of May 30, 1890, and June 15, 1891, allow us to say that this report has puzzled us more than a little; and being unable to deduce the results given under the heads of "Elastic resilience in inch-lbs. per lb. metal" and "Stiffness per lb. of metal," we asked your Western office to explain the table. A telegram was sent to the Schoen Mfg. Co. as follows: "Kindly inform me how you obtained figures for elastic resilience per lb. of metal as given in brake beam circular." The following answer was received: "We obtained elastic resilience by special tests from figures secured. We multiplied the load at the elastic limit by one-half the deflection at that point, and divided by the weight of beam."

Being as much in the dark as before, we wrote Mr. A. S. Vogt, Mechanical Engineer of the Pennsylvania Railroad at Altoona, who had charge of the tests alluded to and under date of Jan. 17, 1893, he says: "No other data were taken in the brake beam tests than those given in the report of the Master Car Builders' Association. No set was measured under a load of less than 1,000 lbs. No attempt was made to obtain the elastic limit of the beams." He also says: "I beg to state that the data given in that report were not worked up in our test room, and I am unable to tell you how they were obtained, especially the data in the last column."

This seems to conclusively show that no data were taken from which the "stiffness" or the "elastic resilience in inch-lbs. per lb. metal" could be computed for the National, Westinghouse and Central beams in the tests made at Altoona in June, 1889; in fact, we have been unable to ascertain how these results could possibly be obtained.

We have tested a great number of beams for the different companies, furnishing a complete report with every beam, and have decided on the following report as comprehensive enough for all practical purposes:

The beam is placed in our machine, heads being supported on special castings, the backs of which correspond to the backs of brakeshoes. A straightedge with a micrometer in the centre is supported at the centres of the heads, and the deflection can be read to one ten-thousandth of an inch. The load is applied through the pin, thus approaching as nearly as possible actual conditions in use. After the beam has been loaded several times, to allow the parts to assume their natural position, an initial load of 500 lbs. is applied, which is taken as zero, and successive loads are applied in increments of 1,000 lbs. until a load of 7,500 lbs. or 15,000 lbs., as the case may be, is reached. After each increment, if desired, the load is released and the permanent set noted, if any occurs. From these data a curve of deflections and loads

can be plotted, on which the deflections can be read for any load.

The full load is then thrown on quickly (two seconds) a few times, to note if there is any variation between suddenly and slowly applying loads. The beam is then

terraces was made 6 ft. in every case, so that the slope of the ground between the bent did not exceed $1\frac{1}{2}$ ft. horizontal to 1 ft. vertical.

The sketch shows how this was accomplished. On the completion of the embankment careful levels were

length of the trestle, the ends being cut off. The photograph of the Hamilton trestle, No. 56, also shows this diagonal bracing to a big advantage, the same having the appearance of a veritable network of timber. It will also be noticed how well the lower slopes between the bents are protected by slope walls. It is useless to state that these bents also rest upon masonry.

CEDAR BLUFF, Va., Feb. 1, 1893.

Railroad Commissioners' Reports.

MISSOURI.

The Railroad and Warehouse Commissioners of Missouri, John B. Breathitt, T. J. Hennessey and H. W. Hickman, have made the seventeenth annual report of the Commission, which is for the year 1891. It is dated Oct. 15, 1892. The delay is due to non-receipt of blanks from the printer and the slowness of railroads in making reports. The length of road in the state is 6,164 miles, the net increase during the year being 38 miles. Of the railroad in the state, 106 miles is narrow gauge. The taxes paid by the roads reporting average \$189 a mile, these taxes being paid in 11 different states. In Missouri the average is \$213 a mile. Various notes are given of the physical condition of the roads, among which are the following:

Length of iron truss bridges, miles.....	12
Length of wooden trestle bridges, miles.....	100
Length of other bridges, miles.....	23
Length of iron rails still in use in the main line, miles.....	675
Number of stations in the state.....	1,098

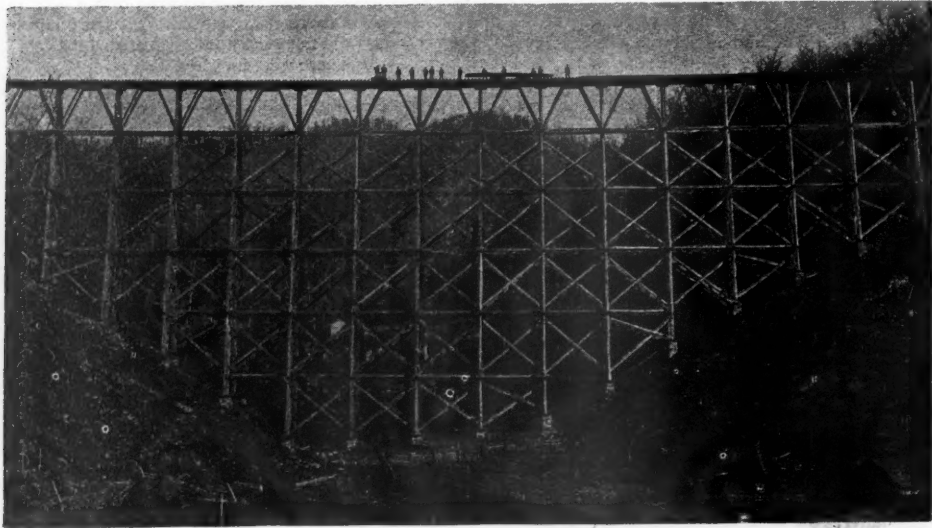
The casualties, "as far as reported," aggregate 215 persons killed and 789 seriously injured, as follows:

	Killed.	Injured.
Employees.....	87	616
Passengers.....	12	80
Other persons.....	116	113

Of the 87 deaths of employees, no less than 22 are attributed to collisions, and of the 12 fatalities to passengers, 7 were in train accidents.

The railroads are generally disposed to comply with the laws, and to carry out the recommendations of the Board. There is no complaint of non-compliance with the law requiring tariffs to be posted, and formal complaints of all kinds, necessitating hearings, have become less frequent. The new railroad laws passed in 1891 are printed in full. Missouri has a good many useless or impracticable railroad laws, and most of those passed in 1891 seem to be no exception to the rule. There is one which attempts to punish spotters for "falsely reporting" that a conductor steals, and another making it a misdemeanor to black-list an employe. The first is probably no better than the general law against perjury, and the other is not only very unskillfully drawn, but is aimed at an alleged crime that is never committed. The legislator with a great love for the "labor vote" seems to be very prominent in Missouri.

The Commissioners recommend certain changes in the laws. One is to change the termination of the fiscal year and the date for making reports. The recommendations of the Washington Convention of Railroad Commissioners concerning the desirability of laws to compel the use of automatic couplers and train brakes are indorsed. The Commissioners desire full authority to regulate highway crossings, including the abolition of grade crossings where necessary and possible, and they say



Trestle No. 59 (Big Lawson)—Norfolk & Western Railroad.

loaded to its elastic limit, i. e., to a point that it shows any marked permanent set, where the curve if plotted would show a marked change of direction.

The following is the form of our report for freight beams:

Test of The..... Brake Beam.			
Weight of beam (complete without shoes).....			
Weight of heads.....			
Weight of clips and other fastenings.....			
Weight of strut.....			
Weight of tension and compression members.....			
Length of strut.....			
Dimensions and material of tension member.....			
Dimensions and material of compression member.....			
Loads.	Deflections.	Set.	Resilience per Pound Metal.
500.....
1,500.....
2,500.....
3,500.....
4,500.....
5,500.....
6,500.....
7,500.....
Elastic Limit.			
Maximum Strength.			
Strength per pound of metal..... = Ultimate strength + weight of beam.			
Stiffness per pound of metal..... = Load at .01 in. deflection ÷ weight of beam.			
Resilience per pound of metal = Load × $\frac{1}{2}$ deflection ÷ weight of beam.			
ROBERT W. HUNT & CO.			

Trestles on the Norfolk & Western.

BY EMILE LOW.

I read with much interest the article entitled, "A Lesson in Trestle Construction," which appeared in the Jan. 27, 1893, issue of the *Railroad Gazette*. I think I know exactly where this failure occurred. Your editorial strictures regarding this trestle failure are well merited, and the only fault I find is that you do not speak more harshly of the men who planned this death trap, and of the management of the road, who continued to use it for over three years without attempting to remedy its glaring defects.

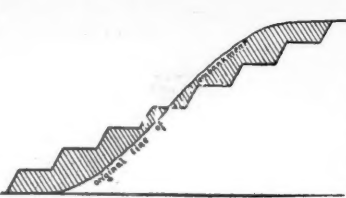
In strong contradistinction to the trestle in question I send you with this a number of photographs of some quite high trestles located on the line of the Clinch Valley Division of the Norfolk & Western Railroad in the vicinity of Cogburn, Va. These trestles, of which there are four, are built over small branches of Bull Run, the latter a tributary of Clinch River.

The following little table shows their main characteristics:

Construction number.	Local name.	Present number.	Length.	Height.	Alignment.	Feet, B. m.
			Feet.	Feet.		
56	Hamilton.....	1,395	520	126	Tangent.....	231,716
57	Kennedy.....	1,396	658	147	5-deg. curve.	308,469
58	Little Lawson.....	1,397	493	120	4-deg. curve.	241,515
59	Big Lawson.....	1,398	646	150	4-deg. curve.	306,451

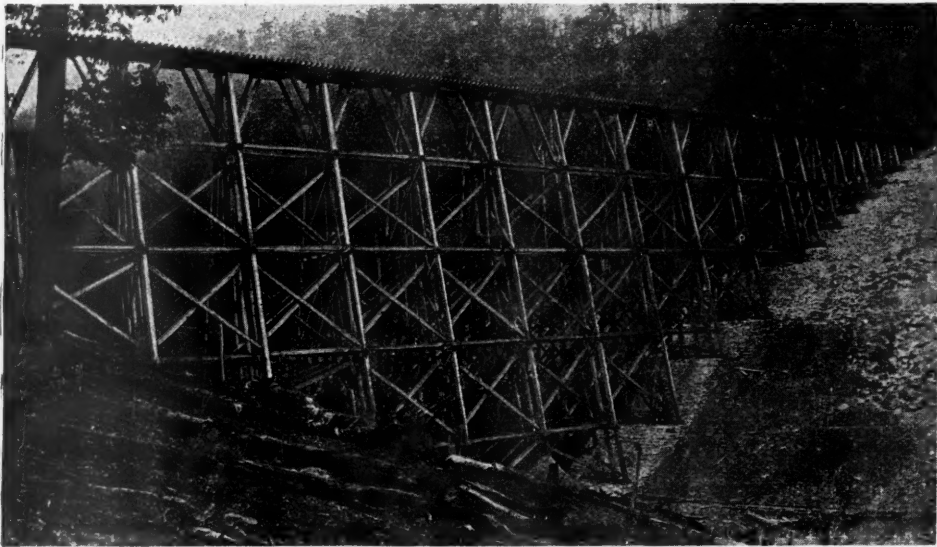
The high bents are spaced 25 ft., centre to centre, while the lower ones are $12\frac{1}{2}$ ft. centres. The highest of these trestles, No. 59, consists of six stories. The distance or height from the base of the rail to the junction, first or top and second stories, is 22 ft. 5 in. The distance measured vertically between junctions of the remaining stories, except the bottom one, is 25 ft. Except at the ends the bents rest upon substantial stone foundations of well laid rubble masonry. You will note the peculiar arrangement of the bents resting upon the embankments at the ends.

On the completion of the embankments they were suitably terraced. The vertical distance between the



template of pasteboard (and to the same scale as the profile) was prepared. This template was moved backward and forward until it was apparent that the material cut above would balance that needed below. Due regard had to be made for the larger amount of material required at the bottom of the slope, owing to the ever increasing width of the base. After the terraces were completed they were covered with a layer of broken stone, upon which the mud sills were placed. This broken stone also served the admirable purpose of allowing the blocks to be tamped up to the proper grade elevation without any difficulty.

I desire to call your special attention to the method employed in bracing these trestles longitudinally. First we have at the junction of the first and second stories two waling strips, 5 in. × 12 in. in size and 23 ft. long, overlapping each other and secured to the plumb posts by $\frac{3}{4}$ -in. round bolts. This series of waling strips also answers for the support of the knee braces, each knee brace being also bolted to the plumb post by a $\frac{3}{4}$ -in. round bolt. At the junction of the other stories the number of waling strips



Trestle No. 56 (Hamilton)—Norfolk & Western Railroad.

is increased to four, although of reduced size, viz.: 4 in. × 12 in., the length remaining the same, 23 ft. Like the upper ones, they overlap one another, and are fastened to the plumb posts by $\frac{3}{4}$ -in. round bolts. The prominent feature, however, of these trestles is the diagonal longitudinal bracing. This bracing is 3 in. × 12 in. in size. There are four pieces in the upper story, while the lower ones contain eight pieces of the same dimensions. These braces, like the waling strips are attached to the posts by $\frac{3}{4}$ -in. round bolts.

The position of this diagonal bracing is particularly well shown in the view of the Big Lawson trestle, No. 59, which view, however, does not show the entire

that if they had full control of the establishment of station buildings they could make a very great improvement at many places. A large share of the volume containing the report is taken up with detailed accounts of the correspondence and hearings of the year. The map of the state, showing the various roads in colors, has been corrected to Aug. 1, 1892.

NORTH CAROLINA.

[From a Correspondent Residing in that State.]

The second annual report of the North Carolina Railroad Commission shows the two main services of such a board in that commonwealth to be, first, a well-devised

agency to increase the revenues of the state; and, second, a safety valve to relieve the pent-up grievances of the public against the railroads. The Board of Commissioners is by law constituted a board of appraisers and assessors of railroad property. During the first year of its administration it increased the assessed valuation of railroad property from twelve millions to eighteen millions, a gain of six millions as a basis of taxation. The second year the valuation was increased another million and a half, to which is to be added another half million on the valuations of 1890-91, making a total increase of eight millions in two years, or an addition of two-thirds of the entire valuation of assessed railroad property at the time the Commission began business. The total mileage in the state is 3,600, making a rate of \$2.17 per mile, or a total increase of revenues of \$78,200 divided among the state, county and town treasuries in which the property is located.

This extraordinary advance is due to two main causes, the failure on the part of the fiscal authorities to attend to the taxing and the collection of taxes, and the fact that when the leading railroads were built the state, having little to invest as a stockholder in these enterprises, guaranteed to the roads by charter exemption from taxation "forever." This legislative exemption of the main lines was held to extend to the branches also. Thus relieved from so important a first charge, the leading lines continued to prosper, building branches at the expense of the localities reached thereby and swelling the volume of traffic over the main lines until it may be said that there is hardly a state in the Union in which railroads have enjoyed so fair a chance to establish themselves before being called upon to share their prosperity with the state.

The trend of judicial decisions is so decidedly in accord with the drift of legislation against exemptions of any kind of corporate property that a popular legislature's guarantee has become the best modern example of "Punic faith." Yet the view taken by Governor Carr in his inaugural message may be right, that the conditions have so changed and the benefits derived from long enjoyment of this privilege so lucrative as to make it only just that all roads enjoying this exemption should voluntarily surrender it. The stockholders of the North Carolina Railroad (part of the Richmond & Danville system), in which the state is a large stockholder, have not yet been able to see it that way, though they have held a meeting to consider the Governor's proposal. The Wilmington & Weldon, against whose claim for exemption of branches from taxation the Supreme Court has decided, offered to compromise by surrendering this privilege of exemption on its main line, also paying a stipulated annual sum on condition of receiving certain legislative grants in lieu of this consideration. Upon the advice of the Attorney-General this offer was rejected. Now, again, the battle is in the legislature, where the avowed policy is to force all exempted roads to surrender by withdrawing from them the essentials of a legal existence. This is a policy "for revenue only." The force back of it may be estimated by the fact that apart from the state treasury 152 towns and 85 counties have shared the benefits of increasing taxation of railroads.

The value of the Commission as a safety-valve for the escape of popular grievance has shown itself in minor though not unimportant affairs. During the year 78 complaints were filed. Sixty-five of these were dismissed, either because parties concerned had been granted relief beforehand because of want of jurisdiction or for want of facts to sustain complaint. Three cases only were appealed to the Supreme Court. Out of the whole number of complaints heard there were nine against express companies and three against telegraph companies. The most interesting case arose in enforcing the rate of 25 cents for a 10-word message between offices within the state, when the only line of transmission between said points lies partly in another state. The Commission ruled that the North Carolina rate held, but from this ruling the defendant appealed to the higher court. Nine circulars were issued explaining, enforcing and classifying rates, one directing that "better provisions be made for females to get in and out of cars."

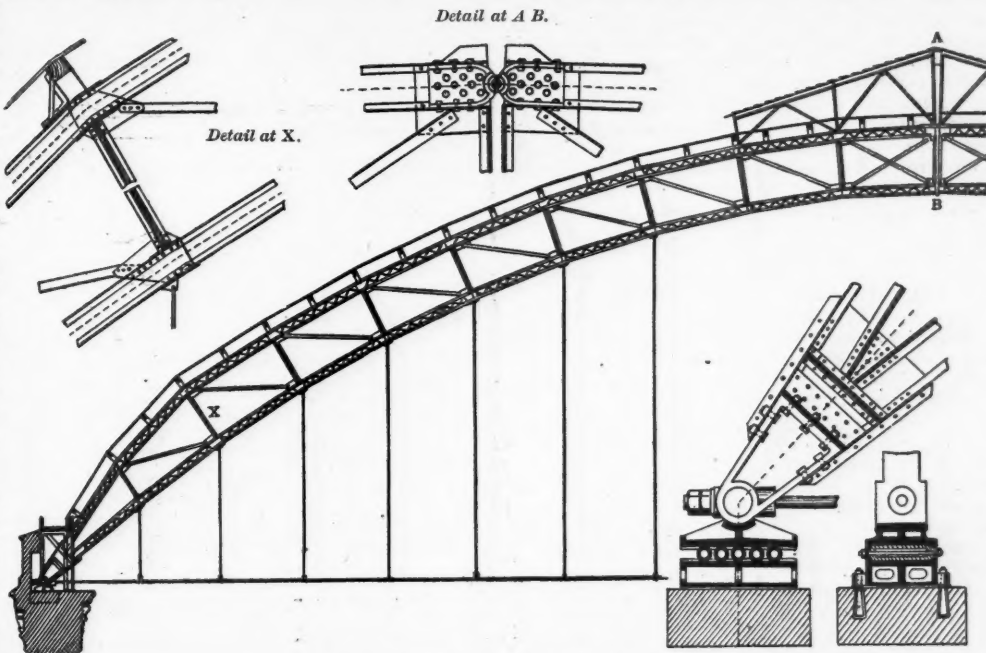
The 68 roads make reports, including exhibit of mileage, history of organization, officers, financial condition, leases and contracts, securities for funded debt, salaries, freight and passenger movements, equipment, renewals of rails and ties, consumption of fuel by locomotives, characteristics of road and accidents. Out of a total of 135 killed and 323 injured, 39 were killed and 127 injured on one road, the Western North Carolina, of 307 miles. The accident at Bostian's Bridge, near Statesville, was by far the most noteworthy one of the year. The Commission is not required to investigate accidents, though it may do so. In this case it exercised its power, and made thorough inquiry, but has kept its report on file in its office, having taken the view that as the responsibility for the accident was to be judicially determined there was no necessity for its making public its results.

This position exposes the Commission to one pertinent criticism, that it loses for itself the advantage to be gained by publicity. The public has nowhere to look for the facts in the case of an accident, except to the newspapers, whose reports are by no means always trustworthy. An official jury, as it were, of three men

like those constituting this Commission in North Carolina, could gather more information, looking to the cause of an accident, in one day's investigation on the spot than a jury could get in the court room in a week. Again, the publication of the causes of accidents, as far as discoverable, no doubt has the effect of educating the traveling public to an appreciation of the dangers of travel and to intelligent views as to their avoidance.

The Commission has as a rule allowed itself minimum jurisdiction in construing the law under which it operates. It has been sure of its ground before acting, thus gaining a degree of respect seldom awarded to an administrative bureau in so short an experience under such circumstances. Though the conditions of transportation are of the simplest and least complicated kind in North Carolina, still in no case has the Commission tried to force a solution of any part of what is vaguely called the "railroad problem."

One hundred and fourteen miles of road were put into operation in 1892. The falling off from 1891 is accounted for by the general financial reaction from the speculative craze of that year, the hostility of popular leaders to corporations generally by which investors declined to invest in securities, the reduction in cotton acreage and consequent raising of home food-products, thereby lessening greatly the volume of the freight movement from and to the state—these causes fully account for the decline in railroad building.



Roof Truss, Anhalt Station, Berlin.

The only important change of ownership of the year has been in the absorption of the Durham & Lynchburg and the Roanoke & Southern by the Norfolk & Western, bringing this system into the very heart of the state. By the former line, from Roanoke (Va.), it reaches Winston; by the latter it reaches Durham, giving these two leading shipping points outlets to the West and dividing the traffic with the Richmond & Danville. This new combination gives central Carolina direct access to the coal fields of southwest Virginia. The passage of the Richmond & Danville system into receivers' hands has not directly affected the year's development unfavorably. With the widespread revival of industrial enterprise along its lines, with the next few years clear of abnormal political diversions from business, together with a general feeling of security throughout the South, much lost prestige is likely to be restored during the year to come.

Roof Truss for the Trainshed of the Anhalt Station Berlin.

We give herewith a half elevation and certain details of the three-hinged arch roof truss of the trainshed of the Anhalter Bahnhof, Berlin, which is 541 ft. 2.5 in. in length. The span, the greatest used for a similar purpose on the Continent, is 198 ft. 5 in. c. to c. of pins, or 54 ft. 3 in. less than that of the same type of truss at the new Pennsylvania station, Jersey City. There are but two wider trainsheds in Europe, those at St. Pancras, London, and the Central station, Birmingham, but they are much lower.

The rise of the truss in this case is 48 ft. 1.6 in., that of Pennsylvania truss is 89 ft. 9.5 in. The arch springs from granite bases 21 ft. 10 in. above the level of the tracks. The Pennsylvania truss rises from the track level, so that the trainshed is in all, nearly 20 ft. higher than the one in Berlin.

The trusses are erected in groups of two which gives the shed a light and graceful appearance. The loading was calculated with the following as units:

Wind pressure 8 lbs. per square foot of horizontal projection
Weight of snow 10 " " " " " " " " " " " "
Dead load, 19 " " " " " " " " " " " "

Total 37 lbs. per square foot of horizontal projection
The conditions of variable loading were assumed to

be, (1) An average inclination of the roof of 30 deg. with the horizon, all lateral wind pressure being neglected (2) uniform covering of snow with wind pressure on all points; (3) uniform covering of snow with wind pressure on right or left side.

In considering the results of these calculations, the following working stresses were adopted in designing the various members of the trusses:

Iron.....16,000 lbs. per square inch
Steel.....17,000

Each member was submitted to a tensile stress of $1\frac{1}{2}$ times the calculated one.

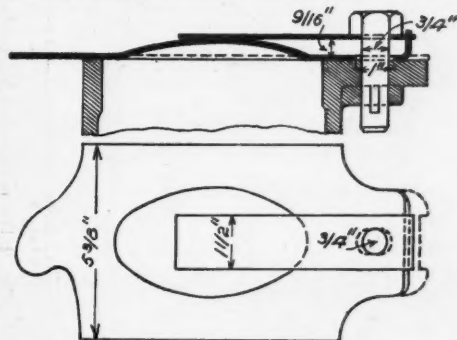
The total weight of the structure is about 540 tons, and the cost of the iron was about \$80 per ton, including painting and erection. Each truss was erected by means of false work at one end of the building and then moved to its proper position by carriages mounted on rails laid on the lateral walls.

All the arrangements of the station are very complete and it is regarded as one of the finest in Europe. The system of handling baggage is ingenious. It is all received at one end of the building and raised by hydraulic lifts to the level of the tracks and handled on platforms especially devoted to the baggage. By this means the passenger platforms are not obstructed with baggage trucks, and consequent accidents and delays are avoided. Mail matter is handled in the same manner. We are

indebted to *Les Annales des Travaux Publics* for the illustrations and particulars.

The Kewanee Journal Box Lid.

The illustration shows a journal box lid made of pressed steel with a steel spring. It is for the Master Car Builders' standard journal box, and differs from other lids in the method of applying the spring, which is made of a straight piece of steel fitted into a slot provided in this lid, as shown by dotted lines in the plan.



It is $1\frac{1}{2}$ in. \times $\frac{3}{4}$ in. and $6\frac{1}{2}$ in. long. The lid is made of mild steel $\frac{3}{8}$ in. thick, pressed to the form shown. The claims made for this lid are that it can be used with any type of bolt; that the lid has no openings to admit dust, and that temporary repairs can be readily made by substituting other straight pieces of steel for the simple spring used. This lid is made by the Northwestern Equipment Company, Monadnock Building, Chicago.

The Abt Rack Railroads.

Last week we noted the fact that the new railroad from Beirut to Damascus is to use the Abt system to cross the mountains. There are now 19 roads using this system, with an aggregate of 103 miles of road, pretty well scattered over the world—in Switzerland, the Austrian province of Steiermark, Bosnia, Greece, France, Spain, Venezuela, Colorado (Pike's Peak), Japan and the Hartz Mountains, the latter, built in 1896, having been the first completed.

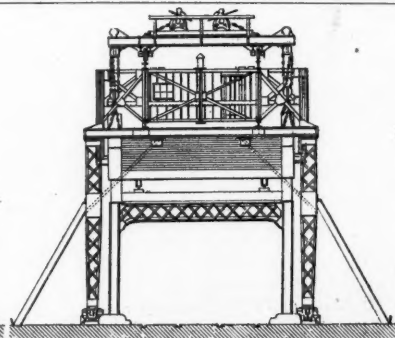
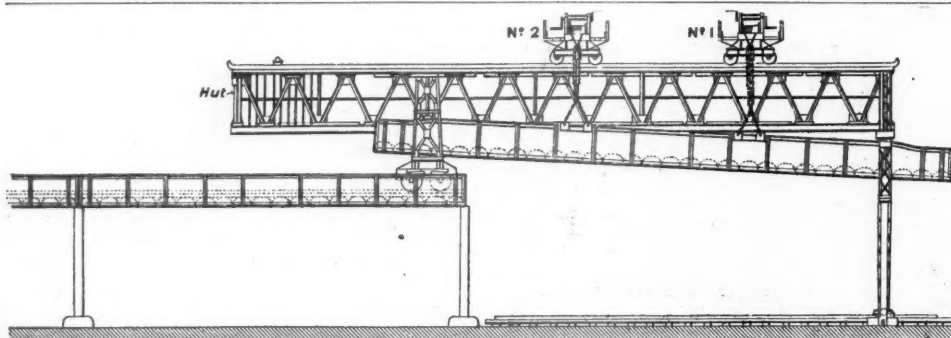


Fig. 7—Longitudinal View.

Method of Erection, Showing Complete Span Being Lowered Into Position from Traveling Gantry.

The Liverpool Overhead Electric Railroad.

This line, the first elevated road in England, and the first elevated anywhere operated by electricity was opened on the 4th inst. It traverses the whole length of the famous Liverpool docks, a distance of about six miles. The authorized extensions north and south go beyond the docks and away from the river in order to give better access between the residential neighborhoods reached by them, the docks, and the heart of the city.

With the exception of a short length where the line passes under the Lancashire & Yorkshire Railway coal sidings, the railroad is, as its name indicates, overhead, and for the most part just over the original surface Dock railway. The latter serves for the distribution of freight by horse traction, and has been used also by passenger omnibuses, with specially constructed wheels to enable them to leave the track when necessary. They will leave the rails altogether upon the completion of the elevated road, which will afford a means of transit at least three times as rapid. The Dock line will then be available exclusively for freight. The overhead railroad consists generally of plate iron girders supported upon channel iron columns, and carrying an iron flooring, upon which the permanent way is laid direct, without the usual intervening ballast—see figs. 1 and 2. The normal spans are 50 ft., but there are some of 100 ft., with bowstring girders, and others of special construction for opening and affording a passage to the docks for exceptionally bulky freight, such as marine boilers, etc.; thus there is a tilting bridge near the Sandown Dock, and a swing bridge of novel construction, and worked hydraulically, crossing the entrance to the Stanley Dock. This is the only dock entrance crossed by the railroad, the other docks being on the river side of it. The columns are grouted into cast iron sockets, bedded in and bolted to masses of concrete, forming the foundation, as shown in fig. 1. With the exception of some half dozen spans, the line has been constructed without the use of scaffolding, and with very little interference with the traffic, either of the docks or of the streets. This important end was attained by adopting a construc-

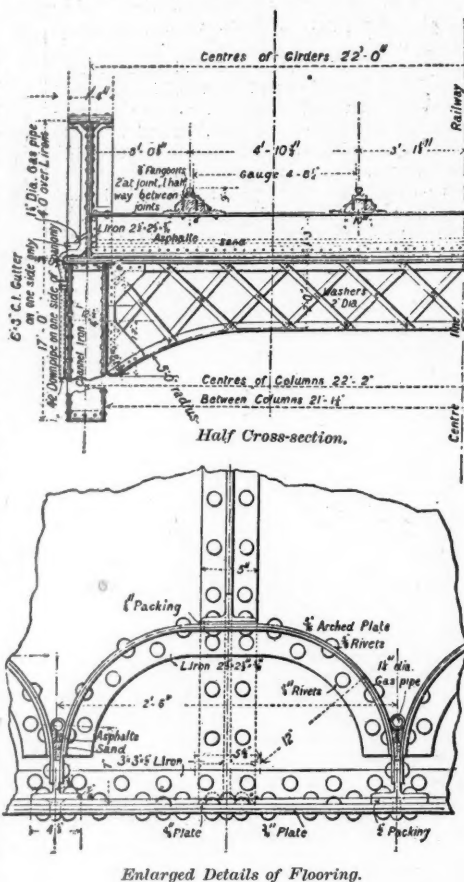


Fig. 2—Roadbed and Floorin_g, Normal Structure.

tion which admitted of each span and its flooring being put together at one end, and transported as a whole over the already completed portion of the railroad.

The decking is of arched plates, as shown on figs. 1 and 2, finishing to 2 ft. 6 in. wide and 15 in. deep, made watertight by asphalt placed in the V-channel between the arches. This form of flooring—known as Hobson's arch plate system—first used here, is being extensively used elsewhere. It is for its weight of great strength and stiffness, and is readily made watertight. The flooring is made of ordinary iron plates and tees, as shown in fig. 2. The plates are 46 in. wide by $\frac{5}{8}$ -in. thick, and vary in length from 22 ft. to 27 ft. The tees are $4\frac{1}{2}$ in. \times $3\frac{3}{8}$ in. \times $\frac{1}{8}$ in. section, and are of lengths corresponding to the plates.

In order to ascertain the exact strength of the floor, some actual sections were tested to destruction, and the deflections at each increase of load were carefully tabulated with the following results, as given by Mr. Greathread in a paper read before the Iron and Steel Institute:—Test: (a) Three sections of floor measuring 7 ft. 6 in. in width; (b) span, 22 ft., ends resting upon supports; load distributed over four points corresponding with the positions of the rails.

The floor deflected $\frac{3}{4}$ -in. with a load of 60 tons, equivalent to a running load of four gross tons per foot forward of each track. The limit of elasticity was reached at a load of 110 tons and a deflection of 2 in. The floor ultimately collapsed by the total rupture of the T-irons at 163 tons, and with a deflection of 10-in. The flat plates are delivered, sheared to exact length and width. Six of them at a time are heated in a long oven—to a cherry-red heat—when they are separately hauled out endways into a hydraulic press, which bends them to the required shape. After cooling upon a grid or frame, where they are tightly held to prevent change of form, they are taken to a multiple drilling machine, which drills the requisite rivet-holes—about 200—in two operations, and in 15 minutes. After the end angle irons for attachment to the main girders are added, the decking is completed by machine riveting the curved plates to the T-irons forming the lower member. These combined operations are performed at the rate of 40 to 45 plates per day.

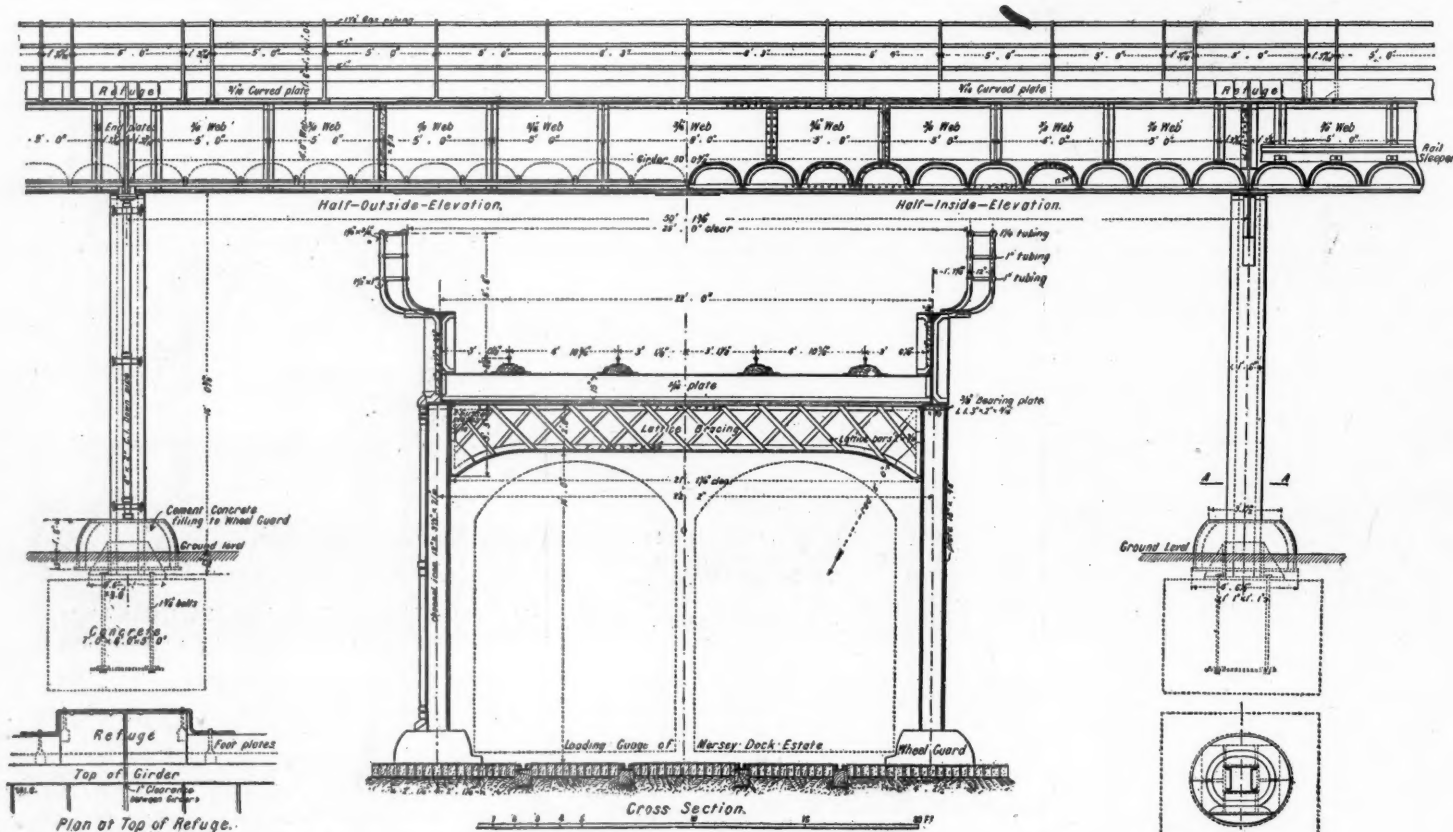


Fig 1—Normal Structure.

There are 15 stations, one of which is shown on fig. 3. They are built upon iron girders and columns, the platforms being about 115 ft. in length by 12 ft. wide, and are 3 ft. above rail level. Access to the platforms is gained from the street level by four staircases at the more important stations, and on each platform a waiting shed is provided with pay offices and turnstiles. An

a novel feature on the railroad will be a system—Timmis—of automatic signals at all the intermediate stations, in place of the ordinary signaling arrangements. These signals will be electrically worked by the trains themselves, and considerable saving in the working expenses will result.

The permanent way is of a novel construction. Longi-

admirably, taking a complete span over a grade of 134 ft. per mile. It ran two trips per day regularly and toward the end made some 24 miles daily. It ran on the two outer rails of the two tracks, making a line of 16 ft. gauge. Some difficulty was expected in working such a broad gauge engine over the numerous curves of 360 ft. radius (15% deg.), but none were experienced, though it had a rigid wheel base of 24 ft. All the 12 wheels were double flanged, and all had 4 in. side play except those on the second and fifth axles. This side play practically reduced the rigid wheel base to 14 ft.

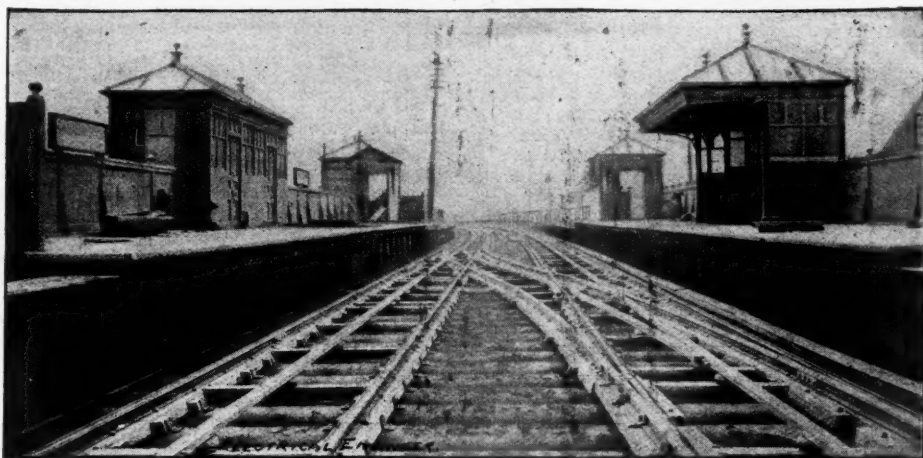


Fig. 3.—Station on Liverpool Overhead Electric Railroad.

extensive car shed is erected near the Hornby Docks with five tracks running through at the same rail level as the main structure of the railroad; and underneath, on the ground floor, is the repairing shop, to be equipped with the necessary tools.

The electricity for working the railroad is generated at a station, for which 12 of the arches, forming the viaduct which carries the coal sidings of the Lancashire & Yorkshire Railroad, have been utilized, near the Bramley Moore Dock, and about the middle of the line. At this station are four engines, each capable of working up to 400 I. H. P., and each driving a separate Elwell-Parker dynamo. The electricity is carried north and south along the railway by a steel conductor, placed on porcelain insulators—as shown in fig. 4—supported upon cross timbers between the rails of each track. Hinged collectors of cast iron, sliding upon this conductor, make the connection between the motors upon the train and the dynamos and the generating station as shown on fig. 5. The motors are not placed—as on the City & South London Underground Electric road—upon a separate motor, but are carried by the cars themselves.

A train will consist at first of two cars, each to seat 56 passengers, and provided with a motor at one end. The cars will be so coupled as to give a motor at each end of the train, and the motors are so connected together as to be controlled from either end by the motoneer, who always travels at the front end, changing ends upon arriving at a terminus, and carrying with him a key, without which the motor cannot be operated. All cars are exactly alike, and contain compartments for two classes of passengers, with through communication from end to end of the train under the control of the guard. A train loaded with passengers will weigh about 90,000 lbs. The trains are lighted by electricity, and are fitted with the Westinghouse brake, deriving its compressed air from a reservoir on the train, the reservoir being charged after each journey. This system of working the brakes has been found to answer well on the

tudinal sleepers, resting directly upon and keyed to the arched decking, support the rails, and transverse timbers the electric conductor, as shown in fig. 4. The lengths of the bearing electric conductor are connected

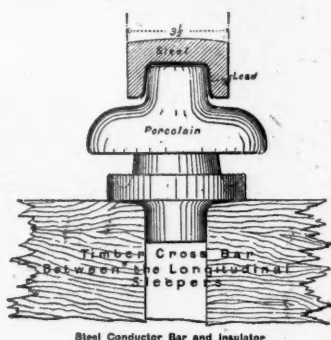


Fig. 4.—Conductor.

by copper pieces, as shown. There is no ballast between the permanent way and the structure, and the working charges in connection with the maintenance and repair of the permanent way should be exceptionally light.

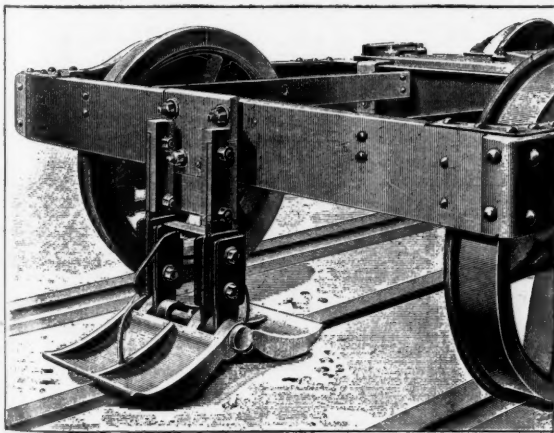


Fig. 5.—Collectors.

City & South London Underground Electric line. The generating station will contain at first six boilers of the Lancashire type, each 30 ft. long by 8 ft. diameter, with a working pressure of 120 lbs., and stoked mechanically. The engines are horizontal, compound, condensing. It is intended to commence running with a five minutes' service of trains, but the generating plant is designed to be capable of working a three minutes' service, and the journey from end to end of the railroad—inclusive of stoppages—is performed in half an hour. There are thirteen stations upon the dock portion of the line, and

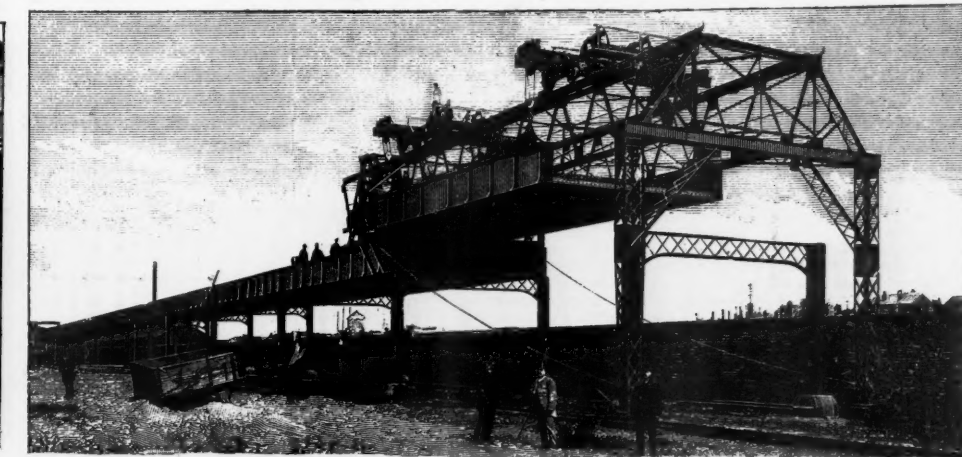


Fig. 9.—Perspective View, Span Being Lowered Into Position by Traveling Gantry.

THE LIVERPOOL OVERHEAD ELECTRIC RAILROAD.

The method of erection is clearly shown on figs. 7, 8, 9 and 10. Each span riveted up complete was loaded up at the bridge yard at one end of the road, on a special car, the wheels of which were geared to an engine so as to make it self-propelling. Owing to the width of the complete girders and flooring (over 23 ft.) the propelling machine and boiler had to be placed completely beneath the load. The result was a most singular looking engine with a horizontal chimney. It, however, did its work

carried 4½ miles, and put in position in two months.

The whole of the erection was carried out without loss of life or limb to any of the men employed. The cost per mile of the road complete, including rolling stock, is given at £25,000 or about \$425,000. The amount included

* A very full and detailed description of the method of erection adopted appears in the *London Engineer* of Jan. 27, 1897, to which we are indebted for the above particulars.—EDITOR RAILROAD GAZETTE.

as paid for land and right of way is not stated separately. Mr. J. W. Willans was the contractor for the works, and Sir Douglas Fox and Mr. J. H. Greathead, the joint engineers, the latter having been the engineer for the City and South London line already referred to.

The New Orleans Bridge.

The following extracts from a recent article in the *Chicago Herald* give some further particulars concerning Mr. Corthell's New Orleans bridge, of which we have recently spoken:

There are two important lines of railroad on the west, approaching the city, parallel to the river, and two on

fourth million cubic feet per second. The bed of the river is to a great depth composed of alternate strata of sand and clay. The land on each side is probably ten feet below the flood level of the river. The country is protected by levees. There is but one point in the river within 15 or 20 miles along the river front of the city and above it that may be considered sufficiently stable for building a bridge. At other points there is, either on one side or the other, a caving bank.

The foundations will probably need to go at least 150 ft. below low water. The superstructure will not be less than 100 ft. in height. The probable entire height of the structure, from the foundation to the top of the superstructure, will be 350 ft. The grade descending from the bridge on either side to the level of the present railroad tracks will probably be about 80 ft. to the mile.

The repair shop has two stories, 17 and 13 ft. high, respectively.

The coils and fan or blower, are on the second floor of the repair shop, the discharge being at the floor line, while the pipes run along the under side of the roof timbers, from which they are suspended. Just before the main pipe passes through the first wall, a branch pipe is taken out of the bottom of same and runs along the ceiling of first story, the system of piping being the same as shown on plan, which heats the second story. The branch pipes in the paint shops pass along the ceiling to the first post, when they turn down to within about 7 ft. of line, and discharge toward outward wall, as shown. These branches are 12 in. dia. The main pipes are from 16 to 54 in. dia. The coil or heater contains 12,000 lin. ft. of 1-in. steam pipe.

The fan used in connection with the heater is a 96-in. steel plate blower, and at a minimum speed will produce a $\frac{1}{4}$ -oz. pressure per sq. in., which is sufficient to change the entire air in the building every 16 minutes, and delivering at a 1-oz. pressure will change the entire air every 8 minutes.

The blower is driven from a countershaft which is on the ceiling of the first story, which in turn is driven by a vertical engine on the first floor next to outer wall.

Live steam is used in the heater in cold weather, and exhaust steam in mild weather, or half live and half exhaust, as desired; the steam enters the coils from the top header in the upper left hand corner, and passes out through the header in the lower right hand corner, to drip pipe.

The cubic contents of the shops is nearly 1,000,000 ft., so that 1 sq. ft. of heating surface is allowed per 330 cu. ft. of contents of shops.

It would appear that this method of heating and ventilating by means of hot-air ducts is more convenient and more easily regulated than by the ordinary method of leading steam pipes over the shops. In the latter method the heat cannot be regulated and cannot be directed at will to any particular job requiring drying, while the expansion and contraction and occasional leakage of long lines of steam pipe are completely avoided.

Canadian Canals.

The Minister of Railways and Canals has laid before the Dominion Parliament a report on the canals of the Dominion in connection with lakes and navigable rivers. The total expenditure to date charged to capital account for construction and enlargement, is \$57,140,530, and the total charge to income account is \$11,408,146.

On the canal toll question, the minister says: "It seems proper here to record briefly certain facts relative to the tolls charged for the passage of wheat and other food products through the Welland and the St. Lawrence canals. In the year 1882 tolls on the Erie Canal were abolished. In the year 1884, on urgent representations from shippers and others interested in the grain trade, Orders in Council were passed with a view to meeting this abolition of Erie Canal tolls. They reduced for the then current season by one-half the tolls for passage through the Welland and the St. Lawrence canals on wheat and certain other food products shipped for Montreal and other Canadian ports east of Montreal. In the following year, 1885, tolls were further reduced on such products to two cents a ton, and thenceforward, year by year, up to and including 1891, this concession has been made by special Orders in Council. In the year 1892 the reduction was conditioned by the provisions that it should be applicable only to products actually exported. In August, 1892, the United States adopted a system of tolls on the Sault Ste. Marie Canal, leaving 20 cents per ton on all freight carried to any port in the Dominion of Canada. It may be noted that the Sault Ste. Marie Canal was transferred from the control of the State of Michigan to that of the Federal Government with the distinct proviso that it should be forever free from toll, and that such transfer took place subsequently to the Treaty of Washington



Fig. 10—Traveling Gantry Placed in Position Ready for Lowering Span.

the east. There are also two other main lines coming from the northeast, one from Louisville and the other from Cincinnati. These six railroads have their own isolated passenger stations. About four years ago it became apparent that something must be done in the near future to free the traffic conditions by connecting the railroads across the river by a bridge; building a union passenger station and a belt railroad, for more easy transfer of freight, and Mr. E. L. Corthell was requested by the city of New Orleans in the fall of 1888 to make a thorough examination of the commercial and physical conditions and to present a report, accompanied by plans and estimates.

The railroad interests, recognizing that the bridge was a key to the entire situation, arranged for the organization of a bridge company under the laws of the State of Louisiana and for the introduction of a bill in Congress authorizing the construction of a bridge above the city of New Orleans. The Board of Directors of this company is composed of six of the leading citizens of New Orleans, and the seventh is Mr. Corthell, who is also President. The legal name of the bridge company is, "The Southern Bridge & Railway Company." The entire railroad interest favored the bill, which was introduced four years ago. Soon afterward another bill was introduced for a drawbridge over the Mississippi River in the lower limits of the city of New Orleans. These two interests necessarily antagonized each other, as Congress would authorize but one bridge at New Orleans.

The bill of the Southern Bridge & Railway Company has recently passed Congress and has been approved by the President.

It is expected that the construction of this bridge will be of great benefit to the city of New Orleans and to the railroads, freeing the river front of the city from a large amount of traffic, which should be transferred between the railroads outside of the city. It will also expedite the movement of local freight by freeing the tracks in the city from unnecessary traffic.

During the pendency of the proceedings to secure the right to build the bridge, the Illinois Central Railroad has built a very convenient and adequate union passenger station, into which four railroads will enter, on the completion of the bridge, namely, the Southern Pacific Texas & Pacific, the Mississippi Valley and the Illinois Central. There is no doubt that the Louisville & Nashville and the New Orleans & Northeastern will reach this union station also by a belt railroad and bridge, and the belt railroad will also enable two local roads built along the banks of the river extending toward the gulf to enter the union passenger station.

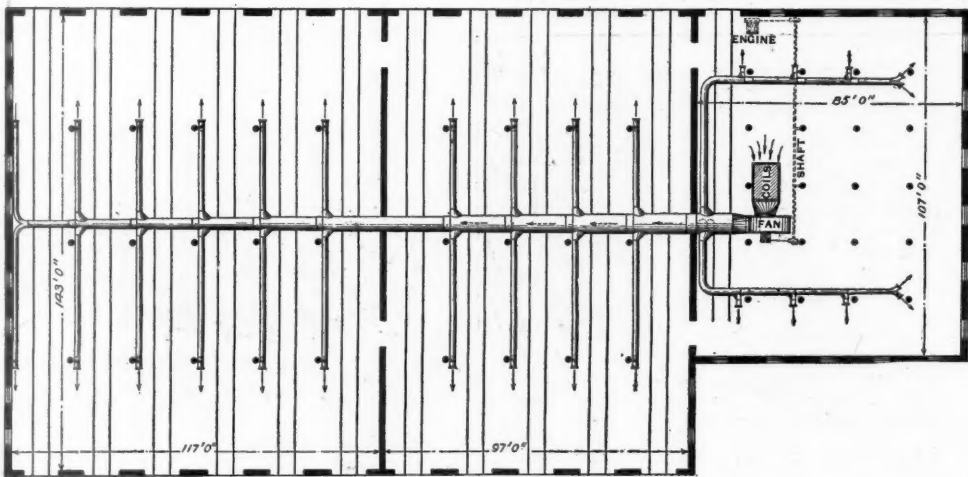
The Mississippi, at the probable site of the bridge, is about half a mile in width, about 100 ft. deep at high water in the deepest part, and its current at maximum stage is about six feet per second—four miles per hour, and the river carries a volume of about one and one-

The total length of the bridge will be about 11,000 ft. long. The total cost of the double track bridge and approaches, with connections with the four railroads near by, is estimated not to exceed \$3,000,000.

Heating Paint Shops.

The accompanying illustrations show the means adopted for heating new car paint shops recently erected at Aurora by the Chicago, Burlington & Quincy, the heating arrangements being supplied by the Huyett & Smith Mfg. Co., of Detroit, Mich.

The air is drawn through coils of steam pipes by a fan



Method of Heating and Ventilating Paint Shops—Aurora Shops, Chicago, Burlington & Quincy Railroad.

which distributes the heated air wherever desired by the system of pipes and branches shown.

The two main buildings on the plan are the two paint shops, while the smaller building on the right is a repair shop. The two paint shops are only one story high, being 22 ft. from floor to ceiling or roof timbers.

and the Undertaking of the State, conformably thereto, that British subjects should have the use of the canal on terms of equality with the inhabitants of the United States."

Referring to the construction of the Sault Ste. Marie Canal, the minister says: "This canal is being constructed through St. Mary's Island, on the north side of the rapids of the river St. Mary, and, with the river

will give communication between Lakes Huron and Superior. At ordinary stages of the river water there is a difference of 13 ft. in the levels of the water above and below this island. The length of the canal across the island is 3,500 ft. A considerable amount of excavation is required to form channels of approach both at the upper and at the lower entrances. The total length of this canal and its approaches will be about 18,100 ft. For contract purposes, the work was divided into three sections, and contracts were entered into as follows: For the lower entrance, on Jan. 30, 1889; for the upper entrance, on March 20, 1889; and for the canal and lift-lock on Nov. 20, 1889. The scheme, as covered, contemplated a lock chamber 600 ft. long and 85 ft. wide, with a depth of water on the sills of 10 1/2 ft. at the lowest known water level; the width of the gate entrances to the lock to be 60 ft. This lock was designed to pass two vessels at one lockage. This scheme was subsequently modified, and the lock is being constructed on the following dimensions adopted by an Order in Council of April 1, 1892: Length of chamber, 900 ft.; width of chamber, 60 ft.; gate width, 60 ft.; depth of water on sills, 10 ft. at the lowest recorded water level. This depth, though calculated on a different basis (extreme low instead of mean water level), is intended to be the equivalent of the depth of the new American lock now under construction. By the scheme, as so modified, accommodation will be afforded to three vessels lying in the lock one behind the other, one of the lake type, 320 ft. long, and two of the Welland Canal type, 255 ft. long, with ready means of entrance and exit on a course through the gates and lock straight with the line of the canal. Under date of Nov. 8, 1892, an agreement has been made whereby the work is to be so expedited as to enable the canal to be completed in readiness for use by July 1, 1894. The canal proper will have a width at low water level of 152 ft., and a bottom width of 143 ft. The depth will be made suitable for navigation at mean water level by vessels drawing 20 ft. The expenditure of this work during the past fiscal year amounted to \$341,474.31, making the total expenditure up to June 30, 1892, \$886,492.55. Since that date and up to Dec. 31, 1892, there has been expended the further sum of \$296,274.83, making the total expenditure of \$1,182,767.43.

Boyd's Signal Case.

The accompanying engraving shows a signal case recently patented by Mr. L. A. Boyd, of Indianapolis, Ind. As will be seen from the cut it consists of two sheet metal tubes, one for carrying a red flag and the other for fuses. The latter will hold three five-minute and three 10-minute fuses. The torpedo holder, made of brass, is fixed to the top of the flag stick. The hooks near the top and bottom of the case are made to hang lanterns upon, and the back side of the case has dovetail sockets made to fit corresponding brackets fixed to the inside of the car in any convenient place. The inventor suggests that these brackets should be fitted to every car on the road which is likely to run on the tail end of a train. The strap, for hanging the case on the brakeman's shoulder, is made with a slip-noose, so that when not in use it can be drawn taut as shown in the engraving. The case is handsomely finished and seems to well fulfill the inventor's design of producing a handy, compact, complete and neat arrangement which shall be an ornament to any passenger car. By its use the placing of flags under seats, in wood boxes or elsewhere where they will get dirty or hidden, is effectually guarded against. The torpedo holder is Patton's patent. The price of this signal holder is \$4. It has been in use two or three years on the Indianapolis, Decatur & Western.



The City & South London Railroad.

This line (the well known "Greathead") has now worked a little over four half-years, and some idea can be formed of its earning capacity. The following table shows the number of passengers and the receipts for each half-year during which the line has been open:

	Passengers.	Receipts.
Eleven days ending Dec. 31, 1890.....	165,000	41,508
Half year ending Dec. 30, 1891.....	2,412,343	19,403
Dec. 31, 1891.....	2,749,055	19,799
June 30, 1892.....	2,813,162	20,931
Dec. 31, 1892.....	3,217,602	22,003
Total.....	11,367,162	83,704

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The table does not include season-ticket holders in the column of passengers, though it includes their payments in the receipts column. This makes the ratio of increase of receipts to increase of passengers much more unfavorable than the table at first seems to show.

Nothing is now heard of any failure in the working of motors, and the line has its regular customers and serves a certain regular traffic, but the management does not seem to have solved the question of fares very successfully, and charges the full rate for short journeys at hours when the empty state of the trains would tend to show that a halfpenny fare would add to the revenue. The working expenses stand at the high figure of nearly 68 per cent. of the receipts. Even if reduced to the common 50 per cent. rate of the ordinary English railroad, the earnings would barely suffice to pay a 1 1/2 per cent. dividend on the ordinary shares; so that our original estimate of the probabilities of this line has not yet been disproved. The directors, of course, hope big things for the Islington extension, which they hope to get through Parliament during the coming session; but any hope of through traffic over the existing line is blocked by the fact of the small diameter of the tubes, while its heavy capitalization makes it a most costly experiment.

Train Lighting by Electricity—Northern Railroad of France.

This company is about to introduce upon its system, beginning with the express trains between Paris and Lille, a system of electric train lighting with which it has been experimenting for some time on separate cars. *Le Journal des Transports* says that it is a storage battery system, current being furnished to incandescent lamps of 6, 8 and 10 C. P., according to the class of the car. The arrangements are such that at any time oil lamps may be substituted for the electric light without disturbing the electrical apparatus.

The accumulators are 16 in number for each car. They are inclosed in groups of two, in a portable box. These light double accumulators are arranged in boxes suspended beneath the car. Each accumulator is composed of nine plates, four positive and five negative. They stand in a small ebonite cell which has a capacity for two more plates. The plates are about 8 in. long x 4 in. wide x 1/4 in. thick, and weigh, individually, about 2 lbs., or 18 lbs. per element, and have a minimum capacity of 14 ampere-hours per kilogramme (2.2 lbs.) of lead. Each element weighs with the liquid and accessories 28 lbs.; the 16 elements, 530 lbs., plus 330 lbs. for the boxes under the cars. The battery has a total capacity of 113.4 ampere-hours.

The lamps are of 30 volts; 10 C. P. for first-class carriages and "voitures-de-luxe"; 8 C. P. for second-class carriages, and 6 C. P. for third-class and toilet rooms. They consume 2.9 to 3 watts per candle power and burn at least 30 hours. They are supported by a piece of hard wood, cylindrical and hollow, which carries the lamp, its attachments and the white enameled sheet iron reflector. This apparatus is placed in the lantern in place of the oil lamp. At the two ends of the car are two commutators inclosed in a small box, by which the current is turned on and off, and which permits the battery to be charged without removal from the car.

The cost of installation is not yet accurately known, as the first cost has been established only upon a small number of cars. The following figures are probably a little too high:

First class and cars "de luxe".....	\$145
Second class cars.....	145
Third class cars.....	150
Luggage vans.....	140

Working expenses are not yet known, and it is the main object of the Paris-Lille experiment to determine them. One noteworthy point is that the storage battery will run the lamps for 35 continuous hours. The oil lamps need attention every 18 hours.

Effect of Turpentine Gathering on the Timber of Longleaf Pine.

The Forestry Division of the United States Department of Agriculture has issued the following circular: In Circular 8 of the Forestry Division, published about a year ago, it was stated that tests made on timbers of longleaf pine, bled or unbled, lent countenance to the belief that bled or tapped timber did not suffer in strength by virtue of the tapping. Further tests and examinations permit now the announcement without reserve that the timber of longleaf pine is in no way affected by the tapping for turpentine. This refers to its mechanical as well as chemical properties, and hence even the reservation that it might suffer in durability is now eliminated and any prejudice against the use of bled timber in construction, wherever the unbled timber has been considered desirable, must fall as having no foundation in fact, being based only on vague belief, proved to be erroneous. It is to be hoped that this fact will be made widely known among builders, architects and engineers who have hitherto made discrimination against bled timber and thereby depreciated or discouraged the manufacture and impeded the sale of an article which answers all the purposes of construction and the unrestricted use of which is dictated by true economy. The basis for the statement regarding the mechanical properties is furnished by a series of tests comprising not less than 300 tests on 32 trees of this pine, bled and unbled, from various localities. The somewhat puzzling fact that bled timber exhibited, if anything, greater strength in the tests has been accounted for by the fact that the turpentine orchards are located mostly on sites which produce better quality timber as well as larger yield of turpentine.

To determine whether any changes in the chemical

composition take place, a series of chemical analyses of bled and unbled timber has been made, which indicates that the resinous contents of the heartwood are in no wise affected by the bleeding; the oleoresins of the heartwood being non-fluid, the whole turpentine flow is confined to the sapwood.

This information is furnished in advance of the full report on the investigations in question in order to remove as quickly as possible the unwarranted discrimination against the product of nearly one million acres of Southern pine, which are annually added to the total acreage in turpentine orchards. This result of authoritative investigation should be worth several million dollars to the forestry interests of the South, permitting readier use and sale for a product that left uncut endangers the future of the forest by the destructive conflagrations to which it is specially subject.

Train Accidents in the United States in January.

COLLISIONS.

REAR.

9th, on Chicago & Erie, at Boon Grove, Ind., a freight train ran into the rear of a preceding freight, wrecking the engine and several cars. A part of the wreck was consumed by fire. A brakeman was injured.

10th, on Baltimore & Ohio, at Bowman, Pa., a freight train which had become uncontrollable on a descending grade ran into the rear of a preceding freight, badly damaging the engine and 3 cars. The fireman was killed and 1 brakeman injured.

11th, on Philadelphia, Reading & New England, at West Winsted, Conn., a freight train ran into the rear of a preceding train, wrecking the caboose and injuring 1 brakeman.

11th, on Chicago & Northwestern, near Kampeska, N. D., a passenger train which had been stopped to make slight repairs on the engine was run into at the rear by a following freight, wrecking the hind passenger car. The engineer of the freight was injured by jumping, but the passengers were warned in time to escape. It is said that when the freight engineer whistled for brakes the rear cars were checked so suddenly that the train broke in two, leaving the front portion to run into the passenger train uncontrolled. It appears that the flagman who went to signal the freight did not go far enough.

12th, on Richmond & Danville, at Rapidan, Va., a freight train ran into the rear of a preceding freight, wrecking 10 cars. Four trainmen were injured.

13th, 4 a. m., on Chicago and Northwestern, near Story City, Ia., a passenger train which had become stalled in a snow bank was run into at the rear by a snow plow, and the hind car wrecked. The fireman and 11 passengers were injured, one fatally.

13th, 8 p. m., on Chicago & Western Indiana, at Fifty-fifth street, Chicago, a local passenger train of the Chicago & Eastern Illinois, well loaded, was run into at the rear by a passenger train of the Chicago & Erie, just as it started away from the station. The rear car was crushed at both ends and pushed forward so as to crush the one in front of it. The third car was also damaged and a stove in it was overturned, setting fire to the cars. Eighteen passengers were injured, several narrowly escaping the flames. It appears that the foremost train had been detained nearly an hour by a freight train, and that the following train did not have proper notice of the fact.

14th, 5 a. m., on West Shore road, near Clyde, N. Y., a freight train running at considerable speed was separated by the breaking of a coupling and several cars of the rear portion were derailed in consequence of the sudden stoppage of the front portion by the automatic application of the air brakes. Eighteen horses were killed. A following train came on before the flagman had time to signal it, and ran into the caboose, fatally injuring a drover.

14th, 11 p. m., on Chicago & Northwestern, near Moin-gona, Ia., a freight train which had been unexpectedly stopped was run into at the rear by a following freight, wrecking the caboose and injuring a brakeman and 5 drovers.

16th, 2 a. m., on Pennsylvania road, near Latrobe, Pa., a passenger train ran into the rear of a preceding freight, wrecking the 2 engines of the passenger train and 5 cars of the freight. One fireman was killed and 4 other men on the engines injured. The passenger train had been admitted to the block section by a caution signal, but it appears that, notwithstanding this, the runner depended upon the freight train to flag him, which was not done, or not done effectively. The freight train had been delayed; it had not tried to clear the passenger train because the conductor had misread an order telling him how late the passenger was.

17th, on Chicago, Burlington & Quincy, near Villisca, Ia., a freight train ran into the rear of a preceding freight and 2 drovers were killed and an engineer and fireman injured.

17th, on Baltimore & Ohio, at Eilerslie, Md., freight train, No. 72, standing at the station, was run into at the rear by the second section of the same train and 2 trainmen were killed. Four other trainmen were injured.

18th, 1 a. m., on Pittsburgh, Ft. Wayne & Chicago, at Hobart, Ind., passenger train No. 4, standing at the station, was run into at the rear by the second section of the same train and all its cars damaged, except the hind car, which was a Pullman dining car, and is said to have withstood the shock better than any of the others. A furious snowstorm prevailed at the time. The porter, the only man in the dining car, was injured. The second section was a freight; two of its cars were damaged.

18th, on Queen & Crescent, near Trenton, Ga., a pay car train ran into the rear of a freight train, making a bad wreck and injuring 1 engineer. A blinding snowstorm prevailed at the time. A part of the wreck was burned up.

18th, on Allegheny Valley road, at Thirtieth street, Pittsburgh, an empty passenger train which was unexpectedly stopped by the breakage of a drawbar was run into at the rear by a following passenger train, doing slight damage and injuring a conductor. One passenger was also injured.

19th, 5:30 p. m., on Pennsylvania road, near Marion, N. J., a passenger train which had stopped for repairs to the engine was run into at the rear by a following express train, crushing the ends of three cars and doing some damage in an east-bound passenger train which passed at the same moment. One passenger was killed and 12 injured; the engineer of the foremost train was under his engine, and was badly injured. The operator at the entrance of the block section where the collision occurred gave the express train a clear signal. The brakeman seems to have gone a short distance back with his red lantern, but there was a curve in the road so that his light could not be seen far. This accident was reported in the *Railroad Gazette* of Jan. 27.

(Continued on page 131.)



ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

At the last meeting of the Western Railway Club Mr. Rhodes read an admirable paper which will be discussed at the meeting next Tuesday. It will be found on page 90 of our issue of Feb. 3, and those who are interested in the relations of wheel to track should read it. The paper suggests what we have often thought and regretted, that maintenance-of-way and track men have mighty little part or interest in the railroad clubs. A year or so ago some effort was made to stir up such interest in the New York Railroad Club, but the result was not encouraging and that, like the others, has become a rolling stock class. But Mr. Rhodes can see two sides of a subject, and he has shown very strikingly the close and necessary relation between the engineer of maintenance of way and the master car builder. And if those officers do not see this relation and get together and reconcile their practice, higher officers will have to take a hand in. It is suggested that the American Railway Association should try to abolish the anomaly of the 4 ft. 9 in. gauge. That will abolish itself in time, but perhaps the Association could hasten the time; but it might be well for that dignified body to look into the relations of wheel gauges to track gauges.

The point of Mr. Rhodes' paper is that, owing to a radical error in the M. C. B. standard maximum distance between the backs of wheel flanges, to intentional and unintentional variations in gauges of track and frogs, to a defect in the M. C. B. flange gauge, and to carelessness in accepting wheels with thick flanges, there are many derailments and there is much unnecessary wear of frog joints. He asks for stricter adherence to existing gauges; for a return to the maximum limit between flanges of 1886, viz., 4 ft. 5½ in.; for a maximum limit for flange thickness, and especially for one standard gauge of track. It will be observed that as regards the first there may be difference of opinion, while all must concede that it is desirable, but difficult to adhere strictly to standards on all these points. We shall be surprised if the discussion is not particularly interesting. It ought to be, at any rate.

The United States Senate at Washington has finally passed a coupler bill, one of those which have been pending in Congress for many months having, after various amendments, been approved on Feb. 11 by a vote of 39 to 10. The provisions of the law as passed are:

Sec. 1. Driving wheel brakes and apparatus for operating train brakes must be used on all engines (passenger and freight), used in interstate traffic, after Jan. 1, 1898. From the same date no train must be run unless it has sufficient cars braked by power brakes to enable the engineer to control the speed.

Sec. 2. From the same date it shall be unlawful to use cars not coupling automatically by impact; cars must also be capable of being uncoupled without going between them.

Sec. 3. When a road has its cars sufficiently equipped it may refuse to receive from connections or shippers cars not equipped so as to interchange.

Sec. 4. Grab irons must be provided after July 1, 1895.

Sec. 5. Within 90 days the American Railway Association may designate the standard height of drawbars for freight cars. If the Association fails to do so, the Interstate Commerce Commission shall set a standard by July 1, 1894, which shall be the lawful standard after July 1, 1895.

Sec. 6. The penalty for violations of this act is \$100 for each offence. This section also provides that the act shall not apply to four-wheel cars.

Sec. 7. The Interstate Commerce Commission may extend the time for each road after hearing and for good cause.

Sec. 8. An employé injured by an unlawful coupler shall not be deemed to have assumed the risk, even though he knows of its existence.

The Senators who voted against the bill were Messrs. Blodgett, Brice, Daniel, George, Gorman, Harris, Morgan, Sawyer, Stewart and Vance. The discussions of the bill in the Senate, as reported in the newspapers, have been rather desultory and not very intelligent. The bill as passed is formally an amendment of the O'Neill bill which passed the House some time ago; but, in fact, it amends that bill out of existence. So now the question of concurrence by the House comes up. The time is now so short that it seems unlikely that the bill will get through the lower house of the fifty-second Congress.

The United States and Good Roads.

The movement for good roads is making great strides according to the reports of its enthusiastic promoters, the officers of the various leagues and associations which have been formed to agitate the subject. The mass of writing upon it in the several varieties of periodicals has increased enormously; writers for the magazines have secured the insertion of illustrated articles; conventions have been held in several states; some of the governors have made references to the subject in their messages to the legislatures, and at last we have a national league, formed at Washington, offering its aid to all the other minor organizations; but undertaking especially, as we understand it, to push legislation in Congress appropriating money to be expended for the benefit of somebody.

It does not yet appear that these enthusiastic advocates of good roads are proposing to construct any such themselves, but only to agitate until others take up the business seriously and build for them. To paraphrase Sidney Smith's genial analysis of a similar situation, A, having learned that B needs better roads, urges C to make them. Probably B (the resident farmer or landowner) is the only party who will contribute to the cost of the improved road, and he will not be much excited by the appeals to C, according to recorded experience. It is possible that the national league, which is young yet, may reconsider its proposed action.

Among the appropriations to be urged by the league we have seen mention of one for \$15,000 to enable the Secretary of Agriculture to make inquiries about roads and road legislation in this country, and to procure the dissemination of more copies of the United States consular reports on roads in foreign countries, and another appropriation, of \$50,000, to promote a road exhibit at the World's Columbian Exposition; two expenditures which would involve an idle waste of public money. For all the inquiries which the Secretary may make or cause to be made can only yield the information which we already possess—that there are only bad roads in most parts of this country and that good ones can be had anywhere as soon as the people will bear the cost of building them. The document issued by the State Department containing the consular reports on foreign roads has no value for popular distribution, and not much value for any use. The little information it contains is technical and is better given elsewhere. It contains nothing of interest not already familiar to every civil engineer, and to most persons who have any interest in the subject who have traveled and observed; and there is probably not a community of 2,000 inhabitants in which there does not now live an engineer and contractor who are, either of them, competent to build good roads with economy and dispatch if any one will pay them for doing the work.

As to the Chicago exhibit the managers of the Fair have made excellent provision, only they have not proposed to erect a separate building for the exclusive benefit of those interested in road building or in the agitation of the subject, which is probably the reason for this demand for a special appropriation. We can conceive of no advantage to be afforded to any portion of mankind, except to patentees of grading machines,

stone crushers, brick machines and other such implements, by a special exhibit of roadmaking materials and apparatus, since every item of the exhibit can be seen in another and appropriate place, by all concerned.

We fear that the earnest advocates of good roads are in danger of being used to further private rather than public ends, and need to consider the subject from another point of view. It is not necessary for them to take the smallest pains, nor to make an effort, however slight, in order to teach methods of construction. We have as good roads here as exist in the world; we have treatises upon their construction, written by American engineers, which are better for us than any prepared in other countries, because they cover foreign experience and American experience also. The few persons who care to know about the legislation in the several states upon this subject can easily learn about it. It will probably form a special topic in our contemporary *Good Roads*, which is said to have a wide circulation. It is important to spread a belief in the doctrines that good roads will pay; that ignorant people cannot build them economically, if at all; that it is best to employ skilled engineers to build them. Let the writers of tracts and the colporteurs stick to the promulgation of these truths in the agricultural districts, and let technical teachings alone.

When Governor Flower says in his message "with no greater expenditure than at present, but under a different system, each county might be covered with fine macadam roads," he must refer to the abandonment of the present system, in which the farmers direct the outlay in the most ignorant manner, and intend to suggest that the expenditures shall be made under the direction of men who know the art of road-making. The particular information which the taxpayers most require, we insist, is not any sort of technical teaching, but the simple truth that some special knowledge and training are needed by those who undertake the building of good roads; and that a dollar spent by an expert will accomplish more than several dollars expended by one who has less skill and experience.

Finally, if any money is to be spent, let it be used in practical demonstrations; one mile of good road in the clay lands, distant from stone quarries and gravel beds, and another mile upon the prairie, also distant from those bases of supply, would be worth more in dissemination of a belief in the possibilities of good roads there than all the other kinds of agitating which may be undertaken. Where stone and gravel abound we already have abundant demonstration; we only need that the people to be benefited shall be willing to vote the taxes.

The Liverpool Overhead Electric Railroad.

A new departure has been made in this road, which was opened for traffic on the 4th, by the Marquis of Salisbury, who is better known as a statesman, but has also distinguished himself as a very successful railroad chairman. The new line is intended only for passenger traffic and is the first elevated railroad, in our sense of the term, that is running along streets, outside this country; though overhead roads crossing streets and running across blocks are common enough in London and other large English cities. Liverpool was the terminus whence the "Rocket" started on its triumphant and epoch-making career, and it is possibly significant that this point also witnesses the inauguration of the first full sized railroad on which electricity is used as the sole motive power. The line has apparently been well planned and skillfully built, and there is every reason to believe that it will prove both a commercial and mechanical success. A speed of over 30 miles an hour has been attained on trial trips, and it is anticipated that the speed in actual service, including stoppages at numerous stations, will fully equal that on the New York Elevated or London Underground—about 12 miles an hour including stops.

Each car carries a self-contained motor, which will save some switching at stations, though a combination of car and motor in one vehicle is generally inconvenient in repairs. As, however, the main sources of wear and tear will be in the dynamos, engines and boilers at a central station, this inconvenience will probably be far less felt than in the case of a combined steam motor and car. The absence of smoke, cinders and steam will do much to lessen the inherent objections to an elevated railroad, while the saving in dead weight and length of train and the diminution in the amount of switching at each end of the run should conduce to convenience in and somewhat diminish running expenses.

Experience can alone show whether the departures from our practice in the method of constructing the superstructure and road bed will prove improvements or otherwise. It is needless to observe that the whole viaduct has a truly British look of stability and solidity.

Account of the Liverpool Overhead Electric Railroad, by the Marquis of Salisbury, Chairman of the Liverpool Overhead Electric Railroad, and by the Marquis of Salisbury, Chairman of the Liverpool Overhead Electric Railroad.

and that the bridge flooring is solid and is designed to be water tight. Another peculiarity of railroad bridges, on the other hand is also noticeable. Hand rails are provided at both sides for the whole length of the structure, but while trackmen are thus carefully protected no provision appears to be made for preventing a train falling into the street should an axle fail or a car become derailed. No guard rails are provided, and even a slight derailment on an elevated road may easily drop a train into the street and inevitably cause a frightful accident. The fact that a very simple system of guard rails is an absolutely efficient safeguard against any such disaster is abundantly shown by experience on the elevated roads here, and it is also manifest that these guard rails have often prevented a catastrophe.

Another departure from our elevated road practice is found in the method of working the doors or gates on the car. On the Liverpool line they open outward, instead of inward as here, and are therefore apt to be knocked off, and as they are not under the control of guards or brakemen the doors can be opened by passengers while the train is moving. The doors must be shut by the station staff as the train is moving off, and, on the whole, the system followed, though that usual on all European lines, appears distinctly inferior and unsafe as compared with that used on all elevated roads here.

Two classes of passengers are carried and smoking accommodation is provided for both, while straps are conspicuous by their absence. If the Liverpool road can always permit passengers to sit down and smoke in peace, it will achieve success in a direction in which the pioneer and largest elevated road has utterly failed.

Comfort in Day Cars.

A friend suggests to us that it would be a good plan for the ingenious and fertile general passenger agent to occasionally take a ride in a day coach instead of going over his road only in a sleeper or private car. We know that this idea is not novel, but our friend is very fond of it, and we are willing to help him to get it into print again. In fact, we suspect that the G. P. A. would be surprised, if he should scrutinize his ticket reports accurately enough, to learn what proportion of his passenger receipts comes from people who never enter sleeping cars, but travel by day, and often by night, in day cars. We suspect, also, that he would sometimes be surprised at the contrast between his own road and some others if he were more familiar with ordinary conditions in the day coaches; and that a few journeys taken *incog.*, the way other princes sometimes travel, would bring to his ears a good deal of wholesome criticism of the sort that the Caliph of Bagdad used to hear sometimes when he walked abroad in an old coat.

We have in mind at this moment two kinds of cars, both of which (with a little modification) may be seen in common daily service on roads running in pretty nearly the same territory. On one road we find the cars well lighted, kept at a comfortable temperature, the ventilation watched by an intelligent trainman; and we find high-back seats, spaced so far apart that a long legged man can sit in them without doubling up; and the cars are provided with continuous basket racks and glazed with double windows, so that passengers can see out in frosty weather. On the other road, which is unfortunately closer to the typical road, except in the immediate neighborhood of the great Eastern cities, we find day cars heated by cast-iron stoves made in the company's foundry, and burning wood. The cars are not ventilated except through the accidental cracks; they are lighted by cheap lamps with bad oil, which are apparently never cleaned; the seats are close together; there is one small basket rack to about every three seats, and the single glass in the windows keeps the car cold by rapid radiation and prevents an outlook by the condensation on the glass.

Of course the passenger who has a fair choice between two such roads will take the one that gives him cars of the former class, but unfortunately so much of the passenger traffic is non-competitive on any road that the commercial value of decent and comfortable conditions is not always apparent to the traffic department; but as we have suggested above, the chiefs of this department can get some very useful lessons, without going into troublesome statistics, by riding about a little in the cars of their own roads.

The friend whose suggestion started this sermon is rather "stuck" on the long basket rack, which, he says, after good ventilation, would do more to add to the comfort of day coach passengers than any other one inexpensive and practicable change. There are several railroads on which a continuous basket rack is

now used, and it is not, or need not be, more expensive than some of the highly finished, but comparatively useless, small racks in common service. Of course the advantages of giving room enough in the racks to keep bags, parcels, etc., off the floor and out of the seats are too obvious to need mention from us.

Perhaps our friend is a crank on the little matter of the basket rack, but the general condition of day travel on some of the roads, even those leading out of the large cities, is still barbaric. It is barbaric from the humanitarian standpoint to subject passengers to the discomforts that they often have to endure, but it is just as barbaric from the financial standpoint to make a railroad journey repulsive when it might, with but little additional expense, be made attractive. The latter point is especially important to those roads that have valuable franchises which take them into large towns, and which by a moderate amount of care and skill could build up a large new suburban business; but even where such a business cannot be created or stimulated it stands to reason that the passenger movement can be increased by making it pleasant for people to travel and decreased by making it disagreeable for them.

January Accidents.

Our record of train accidents in January, given in this number, includes 104 collisions, 157 derailments and 12 other accidents, a total of 273 accidents, in which 49 persons were killed and 329 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	But- Crossing ting, and other.	Totl.
Trains breaking in two.....	7		7
Misplaced switch.....	3	5	11
Failure to give or observe signal. 12		2	14
Mistake in giving or understand- ing orders.....	1		1
Miscellaneous.....	11	3	22
Unexplained.....	22	18	40
Total.....	58	28	104
DERAILMENTS:			
Broken rail.....	20		20
Loose or spread rail.....	8		8
Defective bridge.....	2		2
Defective switch.....	5		5
Defective frog.....	4		4
Defective joint.....	2		2
Broken wheel.....	5		5
Broken axle.....	6		6
Broken truck.....	6		6
Fallen brakebeam.....	4		4
Broken car.....	3		3
Loose wheel.....	1		1
Broken side rod (locomotive)		1	1
Misplaced switch.....		8	8
Track repavers.....		3	3
Engine left unattended.....		1	1
Animals on track.....		2	2
Landslide.....		2	2
Snow.....		3	3
Malicious obstruction.....		3	3
Accidental obstruction.....		3	3
Unexplained.....		62	62
Total.....		157	157
OTHER ACCIDENTS:			
Boiler explosion.....			2
Car burned while running.....			3
Explosion in car.....			3
Various breakages of rolling stock.....			3
Other causes.....			1
Total.....			12
Total number of accidents.....			273

A general classification shows:

Defects of road.....	Col- lisions.	Derail- ments.	Other acc'd'ts.	Total.	P.c.
Defects of equipment.....	7	29	8	44	15
Negligence in operating.....	47	11	3	61	22
Unforeseen obstructions.....	14	1	1	15	6
Unexplained.....	49	62	111	222	80
Total.....	104	157	12	273	100

The number of trains involved is as follows:

	Col- lisions.	Derail- ments.	Other acc'd'ts.	Total.
Passenger.....	45	52	8	105
Freight and other.....	156	105	4	265
Total.....	201	157	12	370

The casualties may be divided as follows:

	Col- lisions.	Derail- ments.	Other accidents.	Total.
KILLED:				
Employees.....	17	14	7	38
Passengers.....	6	5		11
Others.....				
Total.....	23	19	7	49
INJURED:				
Employees.....	80	87	3	170
Passengers.....	75	77	3	155
Others.....	1	2	1	4
Total.....	156	166	7	329

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road.....	3	58	9	32
Defects of equipment.....		4	3	16
Negligence in operating.....	6	75	18	89
Unforeseen obstructions and maliciousness.....			7	26
Unexplained.....	2	18	1	19
Total.....	11	155	38	170

Thirty four accidents caused the death of one or more persons each, and 67 caused injury but not death, leaving 172 (63 per cent. of the whole), which caused no personal injury deemed worthy of record.

The comparison with January of the previous five years shows:

	1893.	1892.	1891.	1890.	1889.	1888.
Collisions.....	101	120	116	78	45	72
Derailments.....	157	117	93	29	72	151
Other accidents.....	12	12	12	6	7	16
Total.....	270	249	221	113	124	239
Employees killed.....	38	46	33	52	25	43
Others ".....	11	15	8	15	10	24
Employees injured.....	170	111	118	123	75	107
Others ".....	159	152	92	104	38	116
Passenger trains involved 105	109		79	67	40	118

Average per day:

	1893.	1892.	1891.	1890.	1889.	1888.
Accidents.....	8.81	8.03	6.81	5.52	4.00	7.71
Killed.....	1.58	1.97	1.48	2.16	1.13	2.16
Injured.....	10.01	8.43	6.77	7.32	3.65	7.20

Average per accident:

	1893.	1892.	1891.	1890.	1889.	1888.
Killed.....	0.179	0.245	0.218	0.392	0.282	0.280
Injured.....	0.205	0.036	0.935	1.329	0.911	0.933

The worst railroad disaster in January was that at Wann, Ill., on the 21st, but, as we have heretofore stated, we do not deem it proper to include in our record of train accidents the casualties due to the explosion that followed the collision in this case. An officer of the road has sent us the following details of the disaster:

The train, when it approached the switch, was running about 30 miles an hour, the engineer having discovered the open switch at a point 300 ft. west of it. From the switch to where the oil tank car stood was a little over 400 ft., and, when the engine struck, the speed was not over 10 miles an hour. The force of the collision was not sufficient to derail a single car or wheel in the train or on the siding, but was sufficient to break in the front end of the engine and also the end of the tank car, permitting the oil to flow directly into the dunes; and instantly the engine and train were on fire. The engineer was uninjured by the collision but was covered by the burning oil and was only able to get about 25 ft. away from the engine before he fell, burned to death. No one else on the entire train was injured. The collision occurred about 9 a. m.; the explosion at 11:55. There were eight tanks destroyed by fire, two only exploding. The crowd was warned repeatedly to get away, as there was danger of an explosion.

A committee of the Illinois Legislature has held an investigation of this accident. The reports of the hearings indicate that the line of the road was straight or nearly so and that therefore the fact that the switch was wrong was not discovered by the engineman as soon as it ought to have been; but aside from this the investigation seems to have been chiefly taken up with a lot of useless inquiry and discussion about the status of the delinquent switchman, whether he was equal to a Brotherhood man, how the company treated the Brotherhood, etc. The reports give no evidence of incompetency on the part of this man (it appears that he was a yard brakeman, not a switch tender), so that we may fairly conclude that he was not worse in that respect than the average switchman. The moral, therefore, is to be found, just where it was at first, in the lack of a distant signal. And it does not seriously weaken the argument for placing distant signals at switches, to show that the engineman might have seen this misplaced switch sooner than he actually did see it. A distant signal is not valuable alone for places where enginemen are utterly unable to see the switch, but for all places where in practice they are liable not to see it without regard to the cause of their failure. A signal 10 ft. from the engine is quite likely to obtrude itself on the runner's vision, but one 500 ft. or 1,000 ft. away will not.

Our accounts show that passengers were killed in nine different train accidents in January, and there was an unusual number of very serious accidents. Rear collisions seem to have produced a larger aggregate of disastrous results than any other one class. Besides those in which passengers were killed there were three others which were very bad. In Chicago on the 13th a large number of passengers were injured; near Latrobe, Pa., on the 16th a number of employees were badly injured; and at Dean's, N. J., on the 24th there was great damage done. Besides these collisions there were very bad derailments at Kent, Ill., and near Revere, Mo., though only one passenger in these was killed outright.

We have to make this month the unusual record of a collision due to "defects of road," the crossing collision at Mott Haven on the 6th being due to no direct fault of any employee.

The killing of nine persons on a grade crossing at Lonsdale, R. I., on the 18th has been already noted in these columns. Seven persons were injured, one fatally, in a street car at Chicago on the night of the 18th, the car being struck by a train of the Chicago, Rock Island & Pacific. Lesser accidents at grade crossings were quite numerous in January. On the 11th an express train running from Bound Brook to Jersey City killed a tramp at Somerville, a farmer in a wagon at Bound Brook and a pedestrian at Dunellen.

At Cleveland on the 8th an electric car was not properly controlled and ran into a locomotive, injuring five passengers. At Kansas City on the 13th a cable car ran into a horse car, injuring a number of passengers. In Brooklyn, N. Y., on the 23rd a careless motorman let an electric car run away with him and fall down a bank. At Attleboro, Mass., on the 29th there was a butting collision of electric street cars, injuring a dozen passengers.

Proposed Railroad Legislation.

Items have appeared under this head, of more or less interest from 14 states this week. Alabama is not only the first state, alphabetically, but deserves the prize for originality, or at least there seems to be an earnest effort to deserve it. Mr. Forman has introduced a bill to make all railroad tickets unlimited. This state has also had under discussion a bill prohibiting the running of freight trains on Sunday, but it has been rejected. In Arkansas nearly a whole day was consumed in discussing a bill to compel railroads to furnish freight cars to shippers. This bill is doubtless presented in the interest of the lumber dealers, who have lately complained of scarcity of cars in that region; but they will have to

spend more than one day in instructing the legislators before they will be able to show how the thing can be done. This is, in fact, one of the most perplexing problems connected with railroading, and a lumber shipper of experience ought to know it.

A bill has been introduced in the California Legislature empowering any railroad to consolidate with any other road, in or out of the state; but the California Traffic Association vigorously protests against it on the ground that it is designed to favor the Southern Pacific. The lower house of the Delaware Legislature has memorialized Congress to compel the use of automatic couplers and air brakes on freight cars. In Illinois it is proposed to place stockyards under the control of the state railroad and warehouse commissioners. The bill to limit the price for a berth in a sleeping car has got around to Illinois. The bill to reduce freight rates is central over Kansas this week, and the average reduction from present rates is 50 per cent. Michigan proposes to regulate the issuance of mileage tickets and to abolish some of the exemptions from liability for damages in cases of personal injury that railroads now enjoy.

Minnesota hates the railroads only half as badly as Kansas; at least we may fairly infer that such is the case from the fact that the bill prescribing maximum rates, which was introduced two or three weeks ago, reduces freight tariffs only 25 per cent. The law proposed in Missouri to increase the liability of railroads for damages, where an employé suffers by the act of a fellow servant, is opposed by the coal miners, who insist that they are entitled to equal protection. If the proposed law is amended to include them they are in favor of it.

The Montana Legislature has been considering a bill to suppress ticket brokers, and in North Carolina it is proposed to require separate cars for negroes, as is now done in several Southern states. The Pennsylvania Legislature has voted favorably on a bill, similar to that heretofore brought up in New Jersey, to regulate the employment of telegraph operators who handle train orders. The Texas Legislature has before it a bill, filling half a column of fine print, which endeavors to define liability for damages, etc., on shipments of freight over two or more railroads. The purpose of the bill is commendable, as a consignee often has great difficulty in collecting a bill for loss or damage where he does not have a through bill of lading, but the bill proposed in this case is a doubtful remedy. One of its provisions is a clause requiring the agent at the starting point to send a copy of the shipper's receipt for each freight shipment to the consignee, direct. The main feature, that declaring one railroad to be the agent of another (where a through shipment is made), and permitting the consignee to sue any one of two or more roads that carry a shipment, will probably meet a good many legal obstacles before it becomes an effective law.

Floods, snowstorms and frost have interrupted railroad traffic in many states during the past ten days. Most of the damage and inconvenience is of a kind which northern railroads are familiar with in winter, but the aggregate loss and detention is very large. The Pittsburgh, Cincinnati, Chicago & St. Louis was compelled to suspend all through traffic Feb. 10, on account of the loss of a bridge at Newcomerstown, O., a pier being washed out by ice. The water was very high, and the construction of a temporary trestle was expected to take a week. Through trains were run over the Fort Wayne road via Crestline. This road had not yet recovered from the blockade caused by the heavy shipments of freight and the long continued cold weather. It appears that this blockade of freight (heretofore reported) was due chiefly to the hindrances imposed by the weather. For many days freight engines were able to haul only about half their usual loads. The Fort Wayne road was inundated at several points on Feb. 9 and 10, and the Allegheny Valley had some bad washouts. Difficulties of this kind, more or less serious, were reported from many points in northeastern Ohio. High water made trouble in the Juniata Valley in Pennsylvania, and also in the region of Williamsport. The detentions on account of snow were serious in the region of Sioux City, and reports from Helena, Mont., Feb. 10 said that there had been "no through trains for a week or so." In Colorado a rotary snowplow was wrecked by a snow slide and a half a dozen men were injured, two of them fatally. A dispatch from Portland, Or., Feb. 11, said that trains were on time for the first time in two weeks. In the gorge of the Columbia River, the Union Pacific encountered solid masses of snow and sleet 25 ft. deep, which had to be partially picked out before a rotary snowplow could be used. High water caused delays on the New London Northern road in Connecticut, on the New York Central in the Mohawk Valley, and on the Rome, Watertown & Ogdensburg.

On the 9th inst. the following sentences were pronounced in the Court of Appeals, Paris, in the Panama cases: Ferdinand de Lesseps, five years' imprisonment and 3,000 francs fine. Charles de Lesseps, five years' imprisonment and 3,000 francs fine. Marius Fontane, two years' imprisonment and 3,000 francs fine. Henri Cottu, two years' imprisonment and 3,000 francs fine. Gustave Eiffel, two years' imprisonment and 20,000 francs fine. The fines imposed were the utmost legal penalty, but do not prevent civil action to recover the money misap-

plied. On Wednesday M. Le Guay was sentenced to five years and a fine of 3,000 francs, and M. Prevost to three years and a fine of 100 francs. It is possible to take an appeal to the Court of Cassation, and such appeal will be taken probably in some of the cases. The sentences aroused much indignation in pretty nearly the entire French press; at any rate, so far as M. Ferdinand de Lesseps is concerned. The feeling is that it is a blow at the glory and honor of the French nation. Certainly it is most mortifying that the man who contributed so much to the renown of France should be a convicted felon; but it strikes us that his conviction was not a matter of sentiment with the Court, or a matter of opinion, but that it was a question of law and proved facts. And it would seem, further, that a miscarriage of justice in a case so important and of such wide interest would be a greater blow to the French name than the conviction of their greatest hero. It seems mean to strike a man when he is down, but it is only just and proper to say that it is now, and always has been, a mistake to speak of the elder De Lesseps as an engineer. He never was an engineer, and we do not know that he ever claimed to be one. Mr. Eiffel is, however, and more is the pity.

"The Cape Cod & Cos Cob Railroad" is the name suggested by the *Springfield Republican* in response to our demand for a change in the title of the big new railroad combination in Southern New England. In an artistic sense this is simply perfect. Cos Cob is near enough to the western terminus for all practical purposes, and that name has been waiting these many years to be immortalized in some thorough and fitting way. We suspect, however, that this "cute" suggestion of the *Republican* conceals a Yankee business scheme; the poetic aspect of the proposition is meant simply to blind us to the trick of putting the Massachusetts end first and our end last.

NEW PUBLICATIONS.

Publications of the Technical Schools.—Those who keep track of current scientific literature are aware of the valuable contributions that are frequently made in the publications of the various organizations in the engineering schools. We have before us several of those publications recently received. One is *The Technic*, published by the Engineering Society of the University of Michigan. This is an annual which is sold at 50 cents a copy, and can be had by addressing the Secretary, Mr. E. L. Allor. The present issue is a pamphlet of 112 pages, which contains 16 articles on a variety of subjects. These are written by graduates and under-graduates, and while they are of varying value they are all of considerable interest. One note describes the electrical laboratory of the University, to which some important additions have been made during the past year. A 10 in. x 14 in. Russell, horizontal engine has been put in, which is capable of working up to 70 H. P. at 270 revolutions a minute. A 300-light dynamo made by the Fort Wayne Electric Company has also been added. With this are an exciter, converters and a complete outfit of instruments for the switchboard. There is an installation of 274 incandescent lamps for experimental purposes. Several additions have been made to the measuring apparatus. Additions are making to the engineering building which will be ready for use next year. These additions will give 15 rooms available for class rooms and model and apparatus rooms covering in all a floor space of 1,200 sq. ft. exclusive of hallways and offices.

The *Stevens' Indicator* for January contains nine articles, among which is one on the Heating of Large Buildings, by Mr. A. R. Wolf; one on the Development of the Smoke Box of the Locomotive, by Mr. W. A. Field and Mr. J. T. Wallis; and an abstract of Mr. E. B. Wall's paper on the present situation with regard to air brakes and automatic couplers, which appeared in full in the *Railroad Gazette* of Sept. 30, 1892.

Third Annual Report of the State Board of Health of Massachusetts. Samuel W. Abbott, M. D., Secretary, Boston, Mass.

The excellent work done by various special public bodies of the Commonwealth of Massachusetts, as illustrated, for example, in the yearly reports of the Railroad Commission and in a special case in the somewhat recent report of the Rapid Transit Commission, is again brought to mind by this volume. A characteristic of the sort of work to which we refer is the liberal use of high-class specialists for the investigation of subjects in which they are expert. This report of the Board of Health gives in the introductory chapter a concise review of the year's work of the Board in the way of examination of particular instances of zymotic diseases in various places in the state, and of its investigation of other matters of public concern. The total number of samples of foods and drugs examined during the year was 5,294, which included 2,726 samples of milk. The total ordinary force employed is 19 persons, and the entire expenditure for the year was \$26,237. An interesting chapter of 56 pages gives a summary of instances of advice given by the Board to cities and towns in questions of water supply and sanitation. A very long chapter is devoted to examination of water supplies and rivers, giving tabulated results of a great many examinations. This includes an inquiry into the aëration of natural waters. Another chapter is devoted to experiments on the purification of sewage and water at the Lawrence station.

This includes an account of the results of filtration and a description of some important special biological work. A very interesting sub-division of this chapter is on the differentiation of the bacillus of typhoid fever. The volume has a copious index.

Scribner's Magazine.—Messrs. Charles Scribner's Sons are preparing an "Exhibition Number" of *Scribner's Magazine*, to be published simultaneously with the opening of the Exposition at Chicago. They have planned to make it as fine an example of an American magazine as can be produced. It is not proposed that the text shall relate chiefly to the Fair, but on the contrary, the leading writers and artists have been asked to contribute to the number what they themselves think will best represent them. The pages of text and illustrations will be largely increased.

Freehand Lettering for Working Drawings. By Charles Benjamin Wing, C. E., Professor of Civil Engineering, Leland Stanford Junior University, etc. Published by the author, Palo Alto, Cal. Price 40 cents.

This is a little collection of alphabets for the use of draughtsmen and students in drawing. It is the result of the author's need for a guide for the students of his classes in forming a hand for lettering. The examples are numerous enough and some of them good enough to be useful; but some of them are too bad for imitation, for they would serve rather to conceal than to convey information.

The Great Railroad Systems of the United States.—The February issue of the *Cosmopolitan* contains the second of a series of articles on the "Great Railway Systems of the United States," the publication of which that magazine has begun. The first paper of the series was on the Plant System; the second is on the Atchison, Topeka & Santa Fe, and is written by Mr. Charles S. Gleed, of the law department of that company. The article is a very good one as a matter of record; it contains a good deal of historical detail and some interesting pictures of individuals, but it is somewhat dry for popular reading.

Water Tower, Pump and Power House Designs. New York: The Engineering Record. 1893.

This is a quarto of 34 plates, without text, showing the competitive designs sent in to the *Engineering Record* for the prizes offered by that journal in 1890. A prize of \$250 was divided among the four designs of most merit, but 13 others were considered worthy of honorable mention. In all 112 designs were received. The 17 designs of towers and 17 of power stations which made up the set receiving the prizes and honorable mention are published in the volume now issued, and they make a very interesting and suggestive collection.

Journal of the Association of Engineering Societies. December, 1892.

The December issue of this journal contains Mr. Hudson's paper on "A Practical Test of Compound Locomotives in Regular Service," which was published at great length in the *Railroad Gazette* a few weeks ago. It contains also a continuation of the discussion of Cedar Block Paving, which followed the reading of a paper by Mr. Thomas Appleton, which was published in the November issue. The annual summary of the Index to Current Literature appears in this issue.

Transactions of the American Society of Mechanical Engineers. Volume XIII. 1892.

This volume has recently appeared, and may be had of the Secretary, Prof. F. R. Hutton, 12 West Thirty-first street, New York City. It contains accounts of the New York and San Francisco meetings, with the papers in full that were presented at those meetings, the topical discussions and various miscellaneous matter.

TRADE CATALOGUES.

Second Hand Engines and Cars is the title of a little pamphlet issued by the Manhattan Equipment Company of 115 Broadway, New York City, describing a considerable number of cars and engines for sale by that concern. Most of this equipment is second hand, though there are some new cars. The largest lot consists of a dozen Monarch sleeping and parlor cars which have hitherto run in New England and in Florida. The catalogue gives dimensions and various other details of each engine or car; and it doubtless serves its purpose of drawing the attention of possible customers; but the most important question, that concerning the age of a car, or the amount of service that may yet be got out of it, is in most cases left unanswered. Probably this is not a defect but an unavoidable limitation.

Lidgerwood Manufacturing Company.—This company sends us a new catalogue of hoisting engines, boilers and suspension cableway. The catalogue included also illustrations and description of the loader, which was very fully described in the *Gazette* a few months ago. The catalogue of large pages and is beautifully illustrated. It is necessary for us to say what it shows, the Lidgerwood Company being so well known. York address of the company is 96 Liberty st. has branch offices in six other cities.

Train Accidents in the United States in January.

COLLISIONS.

REAR.

(Continued from page 127.)

20th, on the Philadelphia & Reading, near Lofty, Pa., a freight train ran into the rear of a preceding freight wrecking 20 cars of coal. An engineer and a conductor were injured. It is said that the flagman of the foremost train did not go back far enough.

20th, in Atlanta, Ga., a passenger train of the Central of Georgia ran into the rear of an Atlanta & West Point passenger train, wrecking one passenger car. Two trainmen were injured.

20th, on Missouri, Kansas & Texas, at Sedalia, Mo., a freight train standing on the main track was run into at the rear by a passenger train and several cars wrecked. The engineer was injured.

21st, 2 a. m., on Delaware, Lackawanna & Western, at Delawanna, N. J., a freight train which had been unexpectedly stopped, was run into at the rear by a following freight, running at high speed, making a bad wreck and injuring 3 trainmen.

21st, 4 a. m., on Pennsylvania road, near Harrisburg, a passenger train which had been stopped for repairs was run into at the rear by a following passenger train wrecking one sleeping car, which took fire and was partly burned up; 9 passengers and the sleeping car conductor were injured. It is said that a block signal operator admitted the second train to the section without proper authority. This accident was reported in the *Railroad Gazette* of Jan. 27.

21st, 9 a. m., on Cleveland, Cincinnati, Chicago & St. Louis at Wann, Ill., a passenger train, running at high speed, ran over a misplaced switch and into some cars of oil standing on the side track. The first two oil cars were badly crushed and the oil at once took fire, burning the engine and the first car of the passenger train and killing the engineer. The fire continued about 2½ hours, at the end of which time there was a terrific explosion of one of the tanks, scattering burning oil on a crowd of several hundred people. Of these 59 were injured; 27 of the 59 have died and three others are still in a critical condition. This accident was reported in the *Railroad Gazette* of Jan. 27.

21st, on Wabash road, near Chillicothe, Mo., a freight train which had been stopped on account of a broken coupling was run into at the rear by a following freight, wrecking the engine and four cars. The wreck took fire and most of it was burned up; engineer and brakeman injured.

22nd, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Amboy, Ind., a freight train standing at a water tank was run into at the rear by a following freight. Engineer killed and fireman injured.

22nd, on Northwestern road, at Lake City, S. C., a local freight train standing at the station was run into at the rear by a following freight, and the conductor was injured. It is said that the flagman did not go back far enough.

24th, 3 a. m., on Pennsylvania road, at Deans, N. J., a freight train standing on the main track was run into at the rear by a following freight, throwing an engine and three cars off the track. The eastbound track was blocked by the wreck, and a passenger train ran into it, and six of its cars were derailed and ditched; several of these cars were mail cars and a fire broke out in one of them which destroyed a large quantity of mail matter. Three employes were injured.

24th, on Chicago & Grand Trunk, at Haskell's, Ind., passenger train No. 7 ran into the rear of a preceding freight. The engineer of the passenger train was injured.

26th, on Burlington & Missouri River, near Corona, Col., a passenger train ran into the rear of a preceding freight which had become stalled, wrecking the caboose and five freight cars. The wreck took fire and part of it was burned up. One brakeman and 1 fireman were injured.

27th, 1 a. m., on Southern Pacific, at Reed, Cal., a passenger train ran into some freight cars standing on the main track, wrecking the cars and damaging the engine. It is said that a red lantern was swung to stop the train, but that the engineer suspected that it was in the hands of train robbers and therefore did not apply the brakes.

28th, night, on Chicago & Northwestern, near Cudahy, Wis., an empty engine ran into the rear of a freight train, damaging the caboose and injuring 2 trainmen. There was a dense fog at the time.

28th, on Georgia Pacific, near Lithia Springs, Ga., a freight train ran into the rear of a preceding freight, damaging the engine and wrecking several cars. Four trainmen were injured.

And 27 others on 18 roads, involving 5 passenger and 39 freight and other trains.

BUTTING.

1st, on Buffalo, Rochester & Pittsburgh, near Bradford Junction, Pa., butting collision of freight trains, making a bad wreck and killing one engineer. The other engineer was injured.

6th, on New York & New England, near Union City, Conn., collision of freight trains, badly damaging both engines. A fireman was injured.

12th, on Chesapeake & Ohio, near Dover, Ky., butting collision between a passenger train and a freight, wrecking both engines, 1 baggage and 2 freight cars. Two trainmen were badly injured.

17th, 1:30 a. m., on Louisville & Nashville, at Milldale, Ky., butting collision between a passenger train and a freight on a high bridge. The men on the engines jumped, and 1 was fatally and 3 less severely injured. It is said that the accident was due to a misplaced switch.

23d, on Northern Pacific, near Eagle Gorge, Wash., butting collision between a work train and a freight, wrecking 5 cars and badly damaging the engines. One brakeman was killed. It is said that an order given to the work train was misread.

24th, on Atchison, Topeka & Santa Fe, near Millsdale, Ill., butting collision between freight trains, making a bad wreck. Both engineers and 1 brakeman were killed.

25th, on Cincinnati, Hamilton & Dayton, at Ivorydale, O., butting collision between a freight and a yard engine, badly damaging both engines; 1 engineer was killed.

27th, on Chicago, Milwaukee & St. Paul, at Sigourney, Ia., a freight engine which had left its train to get water was not properly controlled on its return and approached the cars at high speed. The engine reversed and jumped off, and the engine, after striking the train, at once started forward again and ran some distance to a station, where it ran into the head of a passenger train, damaging both engines and a mail car. The mail agent was injured.

27th, on Chicago, Milwaukee & St. Paul, near Ana-

mosa, Ia., butting collision of freight trains, making a bad wreck. One fireman was killed and an engineer injured.

27th, on New York, Lake Erie & Western, at Wallace, N. Y., a passenger train ran over a misplaced switch and into the head of a freight train standing on the side track. One fireman was killed and 2 other trainmen and 1 passenger were injured.

30th, on Chesapeake & Ohio, near Wellsburg, Ky., butting collision between a coal train and a work train, damaging both engines and overturning 2 camp cars. One employe was killed and 2 injured.

And 7 others on 7 roads, involving 14 freight trains.

CROSSING AND MISCELLANEOUS.

2d, on Chicago, Burlington & Quincy, at Seventeenth street, Chicago, a passenger train ran into a car of oil, which at once took fire; the burning oil spread over the ground and 14 cars of lumber were burned up.

4th, on Baltimore & Ohio, near Buena Vista, Pa., collision between a freight train and an empty engine, damaging both engines and 4 cars, 2 train men injured. A part of the wreck was burned up.

5th, on Pennsylvania road, near Glen Moore, Pa., a passenger train ran into a freight train damaging both engines. Three trainmen were injured. There was a furious snowstorm at the time.

6th, on New York Central & Hudson River, at Germantown, N. Y., collision of freight trains, resulting in the injury of 1 trainman and 1 other person.

6th, on New York Central & Hudson River, at Mott Haven, N. Y., collision between a passenger train and an empty engine moving backwards, overturning the tender of the latter and killing the fireman. The empty engine was crossing the main track and had gone beyond the fouling point on account of an imperfect signal. The semaphore which should have stopped him—an automatic signal worked by compressed air—had been operated so as to go to the danger position, but it was held in an intermediate position in consequence of its back end coming in contact with the door of the signal lamp, which had swung open. The approaching engineer therefore saw a white light.

14th, on Pennsylvania road, at Florence, N. J., a passenger train ran into a freight train, making a slight wreck and injuring 3 passengers.

18th, 6 a. m., on Chesapeake & Ohio, at Covington, Ky., a collision between 2 yard trains resulted in the injury of 5 trainmen. It is said that the collision was due to a misplaced switch.

18th, on Lake Shore & Michigan Southern, at Buffalo, collision between an engine and a freight train pulling into a side track, injuring an engineer.

18th, on Terre Haute and Indianapolis, at Knightsville, Ind., a collision of passenger trains, mostly filled with workmen returning from the mines, resulted in the injury of 17 passengers, 1 probably fatally.

20th, 3 a. m., on Central Vermont, at West Randolph, Vt., a passenger train ran into a freight train which was pulling out of a side track, and the engine and several cars were derailed; engineer and express messenger injured.

26th, on Boston & Albany, at Palmer, Mass., a yard engine ran over a misplaced switch and collided with a car, doing considerable damage and injuring the engineer and fireman.

31st, at the crossing of the Burlington & Missouri River and the St. Joseph & Grand Island at Fairmont, Neb., a passenger train of the former road ran into a freight of the latter, wrecking both engines. The engineer and fireman of the Burlington engine were badly scalded.

And 16 others on 15 roads, involving 7 passenger and 25 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

2nd, on Northern Pacific, near Buckley, Wash., a passenger train was derailed by spreading of the rails and the first 4 cars went down a bank; engineer and fireman slightly injured. It is said that the derailment occurred at a point where a trestle had lately been filled in with earth.

5th, on Wilmington & Weldon, at Ruggles, N. C., a freight train was derailed by a broken frog and 21 cars wrecked. One trainman was killed.

12th, on Chicago & Northwestern, near Stanwood, Ia., 3 cars of a passenger train were derailed by spreading of rails, and several trackmen riding in one of the cars were injured.

12th, on Pennsylvania road, near Downingtown, Pa., a passenger train was derailed by a broken rail and 1 car overturned. Four passengers were injured.

13th, on Vandallia road, at Jessup's, Ind., the engine of a freight train was derailed and overturned, killing 2 trainmen. It is said that the rails spread.

17th, 6 a. m., on Atchison, Topeka & Santa Fe, near Revere, Mo., a passenger train was derailed by a broken rail, and the dining car fell down a high bank. It immediately took fire from the overturned range, and 1 of the waiters was burned to death. A brakeman and the 7 other employes on the dining car were injured, and the engineer was injured in trying to rescue the waiter who was killed.

18th, on Chicago, Milwaukee & St. Paul, near Viola, Ia., a freight train was derailed by a broken rail, 10 cars being ditched; conductor, brakeman and 2 passengers injured.

19th, on Long Island road, at Flushing, N. Y., the engine of a passenger train was derailed by spreading of rails and it fell down a bank. The fireman was badly injured.

20th, on Chicago Great Western, near Dubuque, Ia., a freight train broke through a bridge; 1 brakeman was injured.

20th, on Lake Erie & Western, at Peru, Ind., a passenger train running at high speed was derailed near a bridge by a broken joint. The train ran upon the bridge and weakened it so that the first span with the cars fell into the river. One passenger was killed, engineer fatally and 4 trainmen and 6 passengers less severely injured. The wreck took fire and most of it was burned up.

23d, on Bennington & Rutland, near Rutland, Vt., a passenger train was derailed by a defective frog and most of the cars ditched. One passenger was killed and 4 trainmen and 3 passengers injured.

24th, on Illinois Central, near Dixon, Ill., a passenger train running rapidly on a descending grade was derailed by a broken rail, and most of the cars went down a high bank. Eight passengers were injured.

28th, on Chicago Great Western, near Kent, Ill., an excursion train was derailed while running about 18 miles an hour, the first four cars going down a bank and two of them being overturned. One passenger was killed, 28 badly injured and many others less severely. A freight train had been derailed at this point a few

days before, and it is said the track was not in good condition. The first two cars of the passenger train fell into a pool of oil which had been spilled from the freight train, and the prompt use of snow was necessary to prevent contact between the fires in the overturned cars and the oil. The baggage car was occupied by the caterer for the excursion; the cooks in charge of two gasoline stoves extinguished the fires in the stores after the car jumped the track and before it was overturned.

28th, 11 p. m., on Newport News & Mississippi Valley, at Big Chitty, Ky., engine and 5 cars of a freight train were derailed by a broken rail and fell down a bank. Three trainmen were killed.

29th, on Montgomery & Eufaula, near Batesville, Ala., the engine and two cars of a passenger train were derailed by a broken rail and 3 passengers were injured.

31st, on Chicago & Eastern Illinois, near Atherton, Ind., a freight train broke through a bridge and eight cars were wrecked. Several trainmen were injured.

31st, on Quincy, Omaha & Kansas City, near Green City, Mo., the caboose of a freight train was derailed by a broken rail and fell down a bank. Four passengers and 3 employes were injured.

And 24 others on 21 roads, involving 10 passenger and 14 freight and other trains.

DEFECTS OF EQUIPMENT.

5th, on Newport News & Mississippi Valley, near Lucy, Tenn., a passenger train was derailed by some broken brake rigging which fell upon the track. A man in charge of horses in the baggage car was injured.

19th, 8 p. m., on Detroit, Lansing & Northern, near Lansing, Mich., the engine of a passenger train was derailed in consequence of the breaking of one of the driving rods.

21st, on Philadelphia & Reading, near Tamaqua, Pa., a freight train was derailed by a broken wheel and 15 cars wrecked. The wreck was run into by a train running in the opposite direction and a brakeman and 1 other man were injured.

And 26 others on 24 roads, involving 5 passenger and 21 freight and other trains.

NEGLECT IN OPERATING.

4th, on Michigan Central, near Bay City, Mich., a passenger train ran over a misplaced switch and was derailed. A track laborer working at the place was killed and 3 others injured. It is said that the switch was misplaced by one of these trackmen who became confused on the approach of the train.

16th, 10 p. m., on Illinois Central, at Brookline, Ill., a passenger train was derailed by a misplaced switch and the baggageman was injured.

17th, on Atchison, Topeka & Santa Fe, at Tawrie, O., a freight train was derailed by a misplaced switch and the engine overturned. The fireman was killed and the engineer injured.

22d, on West Shore road, at Buffalo, N. Y., a passenger train was derailed by a misplaced switch and the engine overturned. The engineer and fireman were scalded.

And 7 others on 7 roads, involving 2 passenger and 5 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

10th, 3 a. m., on Illinois Central, near Bolivar, Miss., the engine and first 3 cars of a south bound passenger train were derailed by a loose rail, and the engineer, fireman and express messenger injured. It is said that the joint bolts had been removed, and that a freight train which passed a short time before found a sound track.

12th, on Denver & Rio Grande, near Glenwood, Col., a freight train was derailed by some rocks which had fallen upon the track, and the engine was overturned. The engineer and fireman were injured.

15th, on Southern Pacific, near Oswego, Or., a wood train was derailed and ditched by a tree which had fallen across the track. The fireman and 1 employe were fatally injured and 15 others less severely hurt.

15th, on Northern Pacific, near Eagle Gorge, Wash., a freight train was derailed by a log which had been blown upon the track by a high wind. The engineer was injured.

16th, on Rome, Watertown & Ogdensburg, near Greece, N. Y., a snow plow was derailed in a drift and four employes injured.

19th, on Galveston, Houston & San Antonio, near Alpine, Tex., the engine and 9 cars of a freight train were derailed and wrecked by running over a cow. The engineer was killed and a brakeman injured.

And 8 others on 8 roads, involving 4 passenger and 4 freight and other trains.

UNEXPLAINED.

2d, on Philadelphia & Reading, near Reading, Pa., an inspection car was derailed and the fireman was injured.

5th, on Valley road, near Mineral Point, O., the engine of a freight train was derailed and overturned, the engineer being injured.

6th, on Atlantic & Pacific, near Hackberry, Ariz., several cars of a passenger train were derailed and the sleeping car conductor was injured.

11th, on Atlantic & Danville, near Drewrysville, Va., a freight train was derailed and a brakeman was injured by jumping.

13th, on Iowa Central, near Morning Sun, Ia., a passenger train was derailed on a trestle bridge and the rear car was overturned and fell about 30 ft. to the ground below. There were 8 passengers in the car, all of whom were injured, 2 fatally.

15th, on Chicago, Burlington & Quincy, at Murray, Ia., the dining car in a passenger train running at high speed was derailed at a switch and overturned. The car next behind the diner ran upon a side track and over a turntable, finally landing in a field.

16th, on Pennsylvania road, at Thirtieth street, Philadelphia, a Pullman parlor car, which was the last car in a passenger train bound for New York, was derailed and overturned. It fell about 10 ft. and lodged on a temporary trestle at the right of the road. A brakeman and 1 passenger were injured and 4 other passengers slightly hurt.

17th, on Philadelphia & Reading, near Hess, Pa., the rear car of a passenger train was derailed at a switch and overturned. There were 20 passengers in the car, of whom many were injured, 1 seriously. The conductor was also injured.

21st, on Connecticut River road, at Chicopee, Mass., a freight train was derailed, making a considerable wreck, which took fire from the stove in the caboose; 2 cars were burned up, together with the station house. One man was injured by a falling beam.

24th, on Gulf, Colorado & Santa Fe, near Brenham, Tex., a freight train was derailed, 5 cars being wrecked. A brakeman was killed.

25th, on Southern Pacific, near Yuma, Ariz., one car

of a passenger train was derailed and 1 passenger injured.

26th, on Cleveland, Akron & Columbus, near Hudson, O., a freight train was derailed and the caboose and six cars were wrecked; conductor, brakeman and 1 passenger injured.

26th, on Chicago & Northwestern, near Huntley, Ill., two cars of a passenger train were derailed and overturned. One of them, the baggage car, took fire and 2 trainmen were badly burned.

23th, on Rio Grande Southern, near Ophir, Col., an engine drawing a snow scraper was derailed and fell down a high bank. The engineer was injured.

28th, on Houston & Texas Central, near Palmer, Tex., the engine and four cars of a freight train fell through a bridge making a bad wreck. Engineer and 1 other man injured.

28th, on Detroit, Grand Haven & Milwaukee, near Saranac, Mich., a passenger train was derailed and several cars derailed. Three passengers and 2 trainmen were injured.

30th, on Toledo, Ann Arbor & North Michigan, at Boon, Mich., the engine of a freight train was derailed and derailed, and several cars wrecked. Three trainmen were injured.

And 45 others on 33 roads, involving 6 passenger and 39 freight and other trains.

OTHER ACCIDENTS.

1st, on Great Northern, near Java, Wash., a snow plow was wrecked by an avalanche which came down the side of a mountain, and 4 employés were killed.

3d, on Louisville, New Albany & Chicago, near Francesville, Ind., the engine of a passenger train was wrecked by the explosion of its boiler and the fireman killed. A brakeman was badly scalded and a farmer working near the road was injured.

4th, on Pennsylvania road, near Christiansa, Pa., the engine of a freight train was badly damaged by the explosion of its boiler, and the engineer and fireman were fatally injured. It is said that the water had become too low.

14th, on Philadelphia & Erie, near Erie, the steam chest of the locomotive of a freight train exploded, and, according to the report, the steam could not be shut off, so the engineman's view was entirely obscured. The train was on a descending grade and he failed to control the speed; he and the fireman therefore jumped off, both being injured.

15th, on Nashville, Chattanooga & St. Louis, near Tennessee City, Tenn., a car in a passenger train was damaged by the explosion of the heater, several passengers being injured.

And 7 others on 7 roads, involving 6 passenger trains and 1 freight.

A summary will be found in another column.

The Western Section of the Trans-Siberian Railroad.*

BY MICHEL NICOLAËVICH GHERCEVANOF.

[The writer of the article which follows is now Director of the Imperial Institute of Ways of Communication at St. Petersburg; Vice-President of the Harbor Commission of the Russian Ministry of Ways of Communication, and Vice-President of the Imperial Russian Technical Society. He was born in 1830 at Karkof, South Russia; finished his education at the Military Engineers' Academy at St. Petersburg, and entered the service as Lieutenant of Engineers. He was immediately assigned to duty in erecting the fortress of Kiev. In his early life he was sent on important commissions through Europe and published some valuable contributions to engineering literature. He was one of the founders of the Imperial Russian Technical Society. He spent 15 years in the Caucasus, where among other engineering work he built 332 miles of macadamized road, most of it in the mountains. He is an honorary member of the French Society of Civil Engineers.]

The line chosen passes the following points: Tcheliabinsk or Chelyabinsk, Kurgan, Petropavlovsk, Omsk, Kainsk and Sestinskaya (near Kolyvan on the river Obi). The line crosses the river Obi near Krivoschokov, afterward it traverses the river Tom, near Tootalskaya and passing some distance south of Tomsk joins the Mid-Siberian line near Verhne Pocheetansk. The town of Tomsk will be connected with main line by a branch line of 70 versts (46 miles) at a distance of 150 versts (100 miles) from Kolyvan. By this route the line traverses the river Obi in the most advantageous manner. Both the banks of the river are of the same height and the breadth of the river-bed at its narrowest point is 5,600 ft., and the length of the bridge will be 4,200 ft. The grades in the direction of greatest tonnage are 0.6 per cent., and 0.8 per cent. in the opposite direction.

As far as Kolyvan, for a length of 1,321 versts (880 miles) from Tcheliabinsk, the ground is flat and even, which permits the limiting of earth-works to 11,433 cubic yards per verst (one verst = two-thirds of a mile), and the height of the embankment to 3.5 ft., which is advantageous in regard to snow, as it prevents its accumulating. There are no cuttings except on approaching the river, and between Kainsk and the river Obi, for a distance of 150 versts (100 miles), the line has no curves, and besides there are two other straight sections, 50 and 52 versts in length.

On the other side of Kolyvan, that is to say for a length of 300 versts (200 miles), the ground is more uneven and the quantity of earth-works is about 3,500 cubic sagers, or 44,450 cubic yards per verst. On the whole line from Tcheliabinsk, for a distance of 1,621 versts (1,080 miles), the straight and level portions form 80 per cent. of the whole length.

The soil is formed of vegetable earth to a depth of 2½ to 4½ ft., with a subsoil of red clay. On the whole

*In the conversions of quantities and values the following equivalents have been used: Verst = ½ mile; pood = 35 lbs.; rouble (gold) = 76 cents. The gold rouble is worth about 1.7 paper roubles; therefore the estimates of prices and costs are of very uncertain value.—EDITOR.

line there is no rock or debris of any kind. Work can be carried on only four months during the year, and as far as Omsk, diggers may be found among the miners.

The line crosses five large rivers—the Tobol by a bridge of 840 ft., the Ishim by a bridge of 700 ft., the Irtysh by a bridge of 2,800 ft., the Obi by a bridge of 4,200 ft. and the Tom by a bridge of 2,100 ft. Through Kainsk flows the river Om, which is left to the north of the line. Still further to the north extend immense marsh lands called Toondra, which fill all the region between the rivers Irtysh and Obi. To traverse these rivers, bridges have been proposed of masonry piers with caisson foundations and with iron spans. The depth of the foundation alone is 56 ft. On the Obi the two abutments will be founded on rock. On the Irtysh one abutment would have a height of 49 ft. and the other would be replaced by the natural rock.

The soundings of the rivers Ishim and Tobol have been made to the depth of 105 ft. It has been found that the bed of the river Ishim consists of fine sand, and that of the Tobol, to the depth of 82 ft., has muddy sand, below that, sand, and at a depth of 42 to 49 ft. blue clay. On the banks of the rivers Obi and Tom rock has been found at a depth of 42 to 49 ft., and on the Irtysh to a depth of 56 ft.

Nowhere does the ground appear to be continually frozen. All the large bridges are concentrated in two localities, viz.: (1) Those over the Tobol, Ishim and Irtysh, for which 7,337 tons of iron is needed. (2) Those over the Obi and Tom, for which 8,560 tons of iron will be necessary. With the exceptions of these five bridges there are no other large structures, there being only small masonry and timber bridges, with spans of 21 to 70 ft.

From Tcheliabinsk to the Obi no building stone has been found along the line, consequently it has been proposed to construct the piers of the bridges of brick, with stone facing, which last can be received from the upper part of the Irtysh (near Pavlodar) and to a certain amount from Tcheliabinsk. Stone, in sufficient quantity, is also to be found from the Obi to Tomsk, but there are no foundries or iron works in the neighborhood except that of Gorievsky, which has an annual output of 1,127 tons of iron of inferior quality. All the iron for the bridges can be obtained at the Votkinsky iron works at the price of five roubles per pood, including freight and placing (212.80 per ton).

Lime is found near Omsk only. There is a small cement factory near Tcheliabinsk belonging to M. Adrianoff, and there is another one near the Bogoslovsky works, from where the cement can be transported to the line by the rivers Toora, Tobol and Irtysh.

The chief of the railroad explorations finds that on account of the nature of the country it is not practicable to run steam ferry-boats on the large rivers, because they are covered with ice for about seven months in the year, and the rise and fall of the rivers lasts six weeks. The period of ice-flow coincides with that of the highest level of the rivers. There are three or four floods during the summer, particularly on the Irtysh, with an average rise of 21 to 28 ft. On this account the opinion of the chief engineer is that it is necessary either to construct permanent bridges or not to construct any railroads at all; otherwise much time will be lost and great inconvenience caused by the transfer of freight across the rivers by other means than by rail; for, were there no bridges, the boggy nature of the locality and the varying height of the rivers would necessitate great expenditure on dams and high-roads, which would not in the end cost much less than permanent railroad bridges, not to mention the cost and delay of transfer.

The Siberian rivers are remarkable for their short but strong flow of ice, and this is accounted for by their direction being from South to North, and because they pass through a large number of lakes. The breaking up of the ice begins at the source of the rivers, and by the pressure of the upper waters the ice on the lower parts is broken up and driven down simultaneously with that of the upper parts; thus the piled up ice of the lakes is driven down in compact masses.

There is no ballast along the line, though a certain quantity of it can be obtained from the lakes. There is no building timber along the line from Tcheliabinsk to the river Obi. On the section from Tcheliabinsk to Kurgan, it is necessary to transport timber from Kokchetav, a distance of 70 versts (46 miles) from the line. On the section from Kurgan to Petropavlovsk the distance of timber transport is 160 versts (106 miles). Near Omsk it is possible to get timber from the source of the Irtysh, and from Kainsk to Kolyvan or to the river Obi the distance of timber transport is very great. On the other side of the Obi the line enters a continuous forest (tyga,* and on the whole length from Tcheliabinsk to Omsk birch forests are to be met with in certain places; but on both sides of Kainsk, at a distance of 200 versts (133 miles), they are of not very high growth. As there are no forests along the line from Tcheliabinsk to Kolyvan crossings cannot be had cheaper than 75 kopecks (\$0.57) each. A certain quantity of them can be got from Tuimen that will cost not more than 65 kopecks (\$0.49) a piece. On the section from Kolyvan to Tomsk the price of the sleepers is not higher than 30 kopecks (\$0.22).

On the whole distance from Tcheliabinsk to the river Obi the houses of the natives are built of birch logs

*The immense forests of Siberia in the Siberian dialect are called tyga, written in French taiga.

of a diameter from 8½ to 10½ in. Near Kolyvan houses are to be found built of birch timber with a thickness of from 10½ to 17½ in. which have been in existence these last 60 years.

The stations along the line will receive their water supply from springs, for notwithstanding the large number of lakes in the region their water is of no use, either for drinking purposes or for supplying locomotives, on account of the presence of a large quantity of salt.

It seems that there will be no lack of mineral fuel along this line. About 70 versts (46 miles) to the south of Petropavlovsk layers of coal have been found with a thickness of 35 ft. Petroleum springs have also been discovered. Coal is also to be found near Troitsk 120 versts (80 miles), from Tcheliabinsk; therefore it would be useful to build a branch line from Troitsk to Tcheliabinsk.

The approximate cost of a railroad from Tcheliabinsk, exclusive of the rails and rolling stock, but including the cost of five large bridges, is 21,500 roubles per verst (\$16,340 per mile), and with the rails and rolling stock for four trains daily, two in each direction, the cost is 31,500 roubles per verst (\$23,940 per mile).

The construction of the railroad from Tcheliabinsk to Tomsk, according to the opinion of the engineer who made the survey, can be accomplished in four years, that is, by the autumn of 1896; and from Tcheliabinsk to Omsk in two years, on condition that the work will be begun in all sections, and that for the years 1892, 1893 and 1894 a sum of 12,000,000 roubles (\$9,120,000) yearly will be fixed, and in the years 1895 and 1896 7,500,000 yearly, which will make the whole cost of the railroad 51,000,000 roubles (\$38,760,000).

It is proposed to begin the line at four different points, viz.: (1). From Tcheliabinsk to Petropavlovsk, a distance of 482 versts (321 miles). (2). From Omsk (on the Irtysh) in opposite directions, toward Petropavlovsk, 256 versts (170 miles), and in the opposite direction to Kainsk, a distance of 383 versts (255 miles), being in all 639 versts (426 miles). (3). From Kolyvan (on the Obi) toward Kainsk, a distance of 200 versts (133 miles), and in the opposite direction as far as the junction of the branch line to Tomsk, a distance of 150 versts (100 miles), making in all 350 versts (233 miles). (4). From Tomsk the length of the branch line is 70 versts (46 miles), and then 80 versts (53 miles) along the main line to its junction with the central Siberian line.

With regard to the possible movement of freight the chief engineer supposes that the amount of 30,000,000 poods (335,714 tons) annually may be counted on, in connection with which we must bear in mind that according to steamboat owners the merchandise sent to and received from Siberia is in the proportion of 8 to 3½.

According to the report of the local section of the Stall Bank the sum of the annual commercial transactions at Petropavlovsk amounts to 20,000,000 roubles (\$15,200,000). The principal objects of export from this point are tallow, cattle, frozen meat and sheep gut. This last article is exported to the amount of 1,500,000 roubles (\$1,140,000). The town of Koorgan exports nothing except grain, which is exported generally in autumn, cattle during the summer months and the products of cattle breeding also in autumn. Trade and produce increase perceptibly every year in proportion to the augmentation of the immigration to Siberia.

According to the information of Mr. Denisief, the chief of the Altai mining district, the revenue of the imperial states in this locality 11 years ago amounted to only 400 roubles (\$304) yearly, and now it has increased to 70,000 roubles (over \$50,000). Mr. Ignatief, one of the principal owners of the steamers trading on the river system of the Obi, had to refuse freight this year (1891) to the amount of 1,300,000 tons for want of the means of transport. Four years ago he had only 24 steamers at his disposal, and to-day the number has increased to 72, and eight boats of 70 to 100 H.P. each are being built at Tuimen. Now the steamers ascend the Irtysh only as far as Semipalatinsk, but when they will be built with light draught Mr. Ignatief intends ascending the river as far as Lake Zaisan, and thus attract trade to Omsk on the railway line.

The most fertile land situated on the railroad is found between the town Tcheliabinsk and the river Irtysh. The sources of the rivers Irtysh and Obi are looked upon as the best granaries of the country. People emigrate principally to Barnaul, the centre of the Altai mining district.

For want of rain, the famine of the year 1891 spread over all the country as far as the Irtysh, and besides that the locusts, appearing in Siberia for the first time, caused great havoc. At present grain is sold at the following prices per pood:

	Petropavlovsk.	Omsk.	Kainsk.
Rye ..	70 k. (\$0.78 per bu.)	70 k. (\$0.78 per bu.)	25 k. (\$0.28 per bu.)
Wheat ..	110 k. (\$1.39 per bu.)	90 k. (\$1.13 per bu.)	35 k. (\$0.13 per bu.)
Oats ..	50 k. (\$0.60 per bu.)	80 k. (\$0.53 per bu.)	20 k. (\$0.13 per bu.)
	Kolyvan.	Barnaul.	
Rye ..	25 k. (\$0.28 per bu.)		
Wheat ..	30 k. (\$0.38 per bu.)		
Oats ..	42-47 k. (\$0.28-\$0.32 per bu.)	15 k. (\$0.18 per bu.)	

After a good harvest the same three kinds of grain cost at Petropavlovsk 45, 60 and 30 kopecks respectively (\$0.34, \$0.46, \$0.23).

If it is thought worth while to begin the earthworks on the first section of the railroad extending from Petropavlovsk to Omsk with the object of giving employment to the native population, then there would be no

difficulty in obtaining sufficiently good diggers, because the local laborers, working constantly in the gold mines, would be accustomed to this kind of labor. On the section which is being constructed to Tcheliabinsk 20 per cent. of the workmen of the Saltikoff, 20 per cent. of the Gvozdeff, 80 per cent. of the Lepnena, and 90 per cent. of the Chernolavova contracts are natives.

TECHNICAL.

Manufacturing and Business.

The Chattanooga Steel Roofing Co. has succeeded the Cambridge Roofing Co. of Chattanooga, Tenn.

At a meeting of the stockholders of the Tyler Tube & Pipe Co., of Washington, Pa., held recently, the following officers were elected: President, W. P. Tyler; Vice-President, Walter Woodman; Secretary, Charles S. Stone.

The Huntingdon Car & Wheel Works at Huntingdon, Pa., were sold by the Sheriff Feb. 10 under foreclosure proceedings, and were bought in by the bondholders secured by the mortgage.

The Foster Engineering Company, of Newark, N. J., has received an order for 61 pressure regulators to equip the locomotives now being built by the Baldwin Locomotive Works for the Baltimore & Ohio Railroad.

The Detroit Electrical Works has recently been awarded the contract of the Detroit Citizens' Street Railroad, of Detroit, Mich., after sharp competition, for additional motor equipments, this contract calling for 36 equipments.

Howard R. McLean, who has been Superintendent of the Vulcan Iron Works, at Wilkes-Barre, Pa., and of the Pittston Engine and Machine Co., has become Superintendent of the Link Belt Machinery Co., of Chicago; and Thomas R. Griffith, who was for eight years Mechanical Engineer of the coal mines of the Pennsylvania road, has become Engineer of Construction with the same firm.

General Manager David Pottinger, of the Canadian Government Railways, advertises for sale nine locomotives of standard gauge and two locomotives of 3 ft. 6 in. gauge.

The E. P. Allis Co., of Milwaukee, Wis., has begun work on the first of its new buildings, to be 300 x 400 ft., which will be used for the manufacture of large engines. The additions to the plant will cost over \$400,000.

James M. Sherwin has been appointed Assignee of the Erie Car Works, Limited, of Erie, Pa.

The co-partnership heretofore existing between J. G. Hendrickson and F. J. Clamer, under the name of the Ajax Metal Co., is dissolved by mutual consent. The property and interests of said co-partnership have been acquired by the Ajax Metal Company, incorporated, which will continue business with the following officers: J. G. Hendrickson, President; Francis J. Clamer, Vice-President, and J. R. Nelson, Secretary and Treasurer.

The Standard Scale & Supply Co., of Pittsburgh, is building an 80-ton suspension railroad track scale for the Ohio Steel Co., of Youngstown, O.

A pillar crane of 15 tons capacity, made by the Yale & Towne Manufacturing Company, has been sent to Matanzas in Cuba. It will be used on a wharf. The electric traveling crane, built by the Yale & Towne Manufacturing Company for the Columbian Exposition, is at present being erected on its runways in the middle bay of Machinery Hall. The crane will soon be seen in operation placing the various exhibits destined for this part of Machinery Hall.

The Riehle Bros. Testing Machine Co. announce that beginning April 1, Mr. J. R. Matlack, Jr., will act as its representative at the World's Columbian Exposition, Chicago, and can be found previous to the opening of the Exposition at the office of R. W. Hunt & Co., Rookery, Chicago.

The San Francisco Bridge Company calls attention to its special machinery for the reclamation of low land by filling, and at the same time deepening the adjacent water front. All the work of excavation and conveyance is done at one time and at one operation by a single machine. The machine is also adapted for dredging and canal work. The company has invested in plants one-half million dollars, which plants can be made available at different points in the United States for the execution of work of this character. It has under contract at the present time work at the following places: Oakland, Cal.; Honolulu, Hawaiian Islands; Boston, Mass.; Jacksonville, Fla.; Washington, D. C.

The negotiations that have been in progress for some time for the consolidation of the two great wood working machinery companies of J. A. Fay & Co. and the Egan Company, both of Cincinnati, are now complete, and the officers of the new J. A. Fay & Egan Co. will take charge about March 1. The directors of the new company will be Thomas P. Egan, Frederick Danner, W. H. Doane, D. L. Lyon, David Jones, W. P. Anderson, Joseph Rawson, S. P. Egan and Edward Ruthven. Thomas P. Egan will be President, Mr. Danner Vice-President, S. P. Egan Superintendent and Mr. Ruthven Secretary. These four officers are of the Egan Company. The business of the Egan Company was started in 1873 by Mr. Thomas Egan and two partners, the stock company being formed in 1880. The building of the company now covers the square bounded by John, Front, Central avenue and Greenleaf streets, Cincinnati, and the buildings of J. A. Fay & Co. occupy

the square opposite the Egan plant. The firm of J. A. Fay & Co. was established in Keene, N. H., about 1835. The Cincinnati branch being started in 1850. Mr. W. H. Doane was placed in charge of the branch about 1860, and the Cincinnati branch soon absorbed the home plant. Mr. Doane has ever since been President, Treasurer and Manager of the business, and he and D. L. Lyon, his brother-in-law, as Vice-President and Secretary, have controlled the concern, holding considerably more than a controlling interest.

Iron and Steel.

Wm. B. Pollock & Co., of Youngstown, O., have the contract for the new Bessemer department to be erected by the Cleveland Rolling Mill Co.

The new steel plant to be erected at Youngstown, O., will employ at the start over 800 men, and will have a capacity of 1,000 tons of finished steel a day. Nearly all the contracts have been awarded, and the work is going on as rapidly as possible.

New Stations and Shops.

The Ensign Car & Mfg. Co., of Huntington, W. Va., will begin the erection of a new saw and planing mill next month.

Individual Call Bells on Seventeen Roads.

The Gill-Alexander Electric Manufacturing Company, of Kansas City, has issued a pamphlet advertising its telegraph call-bell system, in which it is stated that the individual calls of the company are now in service on the following roads: Union Pacific; Canadian Pacific; Southern Pacific; Denver & Rio Grande; Chicago & Alton; Missouri, Kansas & Texas; Fremont, Elkhorn & Missouri Valley; Kansas City, Ft. Scott & Memphis; Kansas City, Memphis & Birmingham; Burlington & Missouri River; Burlington, Cedar Rapids & Northern; Florida Central & Peninsular; Galveston, Houston & San Antonio; St. Louis Southwestern; Chicago, St. Paul, Minneapolis & Omaha; Colorado Midland; Northern Pacific, and the Chicago, Burlington & Quincy.

Testimonials are printed from the officers of some of the roads. The Union Pacific has 82 bells in use. The uniform rental is \$2 a month for each bell. This apparatus was described in the *Railroad Gazette* of March 13, 1891. It consists of a bell located at a way-station telegraph office, connected with an apparatus by means of which it is set ringing by the sending of a certain combination of dashes and spaces over the wire by an ordinary Morse telegraph key; the train dispatcher is thereby enabled to call a sleeping operator or one engaged several yards or rods away from the office, as the bell rings until it is responded to. After starting the bell the dispatcher can use the wire for other business until the operator answers.

Petition to Annul the Berliner Telephone Patent.

The Attorney-General of the United States has filed a petition in the United States Circuit Court for the District of Massachusetts at Boston, asking that the Berliner combined telegraph and telephone patent No. 463,569, applied for in 1877 and issued in 1891, be annulled, on the ground that the claims in this patent are covered by patents previously issued to the Bell Telephone Company; and, further, if the patent be allowed to continue in force the present close monopoly of the Bell company in the art of telephony will be continued during the life of the Berliner patent. The Attorney-General sets up the plea that such a continuance of the monopoly is against the spirit and intent of the patent laws. On the face of this whole matter, so important to all, is the very apparent fact that this Berliner patent was applied for in 1877, and by various methods well known to patent attorneys the issue of the patent was delayed until the close approach of the end of the Bell patents. The life of a patent dates from its issue and not from the application, hence the advantage of the delay to the telephone company which would gain thereby the monopoly of the art of telephony during the life of the Berliner patent, that patent covering in its claims most of the essential features of a successful telephone apparatus.

Storage Batteries in Train Lighting.

A correspondent writes: "I have been making an analysis of the expense of the different kinds of train lighting, and I need further information regarding the storage battery power required to run incandescent lamps. Will you kindly give me what information is available?" A 16-C. P. 60-volt lamp, which is the ordinary lamp, uses one ampere of current. A 32-C. P. 60-volt lamp uses about two amperes. Most storage batteries generate a current of two volts pressure per cell. On this basis a battery of 30, 50-ampere hour storage cells would run one 16-C. P. lamp for 48 hours. For a 30-volt lamp a less number of cells would be required, but the cells would have to have a greater capacity. Thus, for a 30-volt lamp it would require 15 cells, while for a 60-volt lamp it would require 30 cells. The cost of storage batteries ranges from \$5 to \$10, according to the type. The weight varies from 30 to 75 lbs., according to capacity and style.

Ships and Armor.

The Southern Pacific announces that the Newport News Shipbuilding & Dry Dock Company is making preparations to build two 10,000-ton steamships for the Southern Pacific Company.

The battleship Indiana will be launched at Cramps shipyards Saturday, Feb. 25, at 10 o'clock in the morning.

Bids were opened in the office of the Secretary of the Navy Wednesday, for 6,700 tons of nickel steel and Harveyized steel armor for vessels now being constructed

for the navy, in conformity with an act of Congress appropriating \$4,000,000 for the purpose. Contrary to expectation there were two bidders only, the Carnegie Company and the Bethlehem Iron Works. On account of the complicated nature of the bids submitted, it is impossible to give a comparative statement of them. The prices asked for nickel steel ranged from \$525 to \$650 per ton, according to the shape of the plate, and for Harveyized steel from \$575 to \$675 per ton. The lowest bids on the principal single exhibits were as follows: By the Bethlehem Company, on 13-in. turret plates of nickel steel, \$212 043; Harveyized, \$335,282; on 12-in. turrets of nickel steel, \$321,976; Harveyized, \$355,010; on 8-in. side armor of nickel steel, \$337,351; Harveyized, \$371,711. By the Carnegie Steel Company, on 8-in. turret plates of nickel steel, \$82,157; Harveyized, \$95,340.

New Car Works.

The story goes that Dr. Seward Webb and other railroad men are looking for a site for a new carbuilding plant, to employ about 500 men. They have asked the village of Malone, N. Y., for a \$25,000 cash bonus, thirty acres of land, water and electric lights free, outside of buildings, for five years, and exemption from taxes for the same length of time. The land has been offered by three different parties. This site would give them a location near all the large sawmills of the North Woods and connections with two railroads.

Ajax Metal

The distinctive feature of Ajax metal is the addition of lead to mixtures of copper and tin in such a way that the lead is not only perfectly diffused through the mass, but is fixed and stable in its distribution so that the alloy can be repeatedly melted without any separation or deterioration of the lead from the other metals, and is strictly a scientific and chemical production. As lead is much heavier than copper and tin, and melts and hardens at a much lower temperature, it will be easily understood that to produce an alloy of the three metals in which throughout the entire mass a particle of lead shall be associated with each particle of copper and tin, shall be substantially unaffected by repeated meltings and coolings presented a problem of very great difficulty.

Mr. Clamer was a silversmith as well as a practical chemist and metallurgist and the need in his business of a metal for "spinning" which would not fire-crack when re-heated (a difficulty incident to alloys of copper and tin) led him to attempt to modify the hardness and stiffness of mixtures of copper and tin, by adding lead.

He began his experiments in 1884, and after repeated failures and discouragements, Mr. Clamer produced in 1888 a metal which was fairly satisfactory. While the new metal was originally designed to take the place of brass in the manufacture of articles spun from sheet metal, its remarkable anti-frictional qualities at once attracted attention and a series of tests soon showed that it could easily be placed in successful competition with all known bearing metals.

An alloy composed of copper, tin and lead, in which the lead in minute particles is thoroughly and evenly distributed through the mass, far surpasses in anti-frictional qualities any possible mixture of copper and tin only. Of all the soft metals, copper, tin, lead, zinc and antimony, lead is by much the first in anti-frictional qualities, as shown by the success of lead-lined car journal bearings. And if to the strength and wearing qualities of alloys of copper and tin there is added a suitable proportion of lead, so that the lead is everywhere in the mass, and every part of the bearings as they wear is practically "lead lined," a bearing metal of the very highest anti-friction qualities is produced. When Ajax Metal was struggling for recognition it encountered opposition on every hand.

A mass of the metal was sent in 1884 to the brass foundry of a leading road at the headquarters of the test department, where it was melted and slowly cooled. Then it was again melted and cooled rapidly by setting the crucible in snow. The resulting ingot was a blunt cone, 7 in. long by 7 in. in diameter at its widest part, and weighed 85 lbs. Test samples were obtained by boring to the centre near the top, middle and bottom of ingot, and half of the borings were given to the chemical experts of the road and the remainder and half of the ingot to the representative of the manufacturers of the metal. The chief point to be settled was whether the lead continued to be evenly distributed through the mass notwithstanding these repeated meltings and coolings, each of which (unless the claims of the manufacturer were true) would permit the lead to separate from the copper and tin and settle to the bottom of the ingot. A leading chemist, Dr. F. A. Genth, Consulting and Analytical Chemist of the University of Pennsylvania, gave the following analysis of some of these samples Feb. 14, 1884:

	Top. Per cent.	Middle Per cent.	Bottom Per cent.
Copper.....	81.65	80.31	79.93
Lead.....	10.04	10.47	10.52
Tin.....	8.78	9.11	9.45
Zinc.....	0.05	0.05	0.03
Iron.....	0.09	0.06	0.07
Silver.....	Trace.	Trace.	Trace.
	100.00	100.00	100.00

Yours truly,
(Signed.) F. A. GENTH.

This analysis proves that in spite of repeated meltings, the lead remains distributed with substantial uniformity throughout the mass and it also shows that the quantity of lead in the mass (over 10 per cent.) is sufficient to greatly increase its anti-frictional qualities, beyond those of any alloy composed of copper and tin only.

In 1880 the process of manufacture had been fairly perfected, and the name "Ajax Metal" was adopted as a trade-mark. Mr. J. G. Hendrickson then became associated with Mr. Clamer and arrangements were made to put the metal on the market. Its use has steadily extended as a bearing metal for railroads and other uses where high speed and heavy loads are common. The bearings of the locomotive which has made the highest recorded speed per minute, of the locomotive which has made the swiftest long distance run, and of the steamer which has made the quickest passage across the Atlantic ocean, are Ajax Metal. The makers state that the processes by which they unite copper, tin and lead without chemically affecting the metals and without leaving any trace of chemicals or fluxes in the product is their own. They do not use phosphorus, for that would injuriously affect the metals composing the alloy or arse-

nic, for that not only makes the resulting alloy "short" and brittle and destitute of valuable anti-frictional qualities, but it would be decidedly injurious to those who remelt an alloy of mixture made by its aid. Ajax Metal is simply a chemically prepared alloy of pure copper, pure tin and pure lead in whatever proportions required, as the percentages of lead can be made as high as 40 per cent.

The business has grown from an output of a few tons in 1880 to one of 2,000 tons in 1892.

THE SCRAP HEAP.

Notes.

George June, the Pennsylvania block signal operator arrested for giving a wrong signal, had to give \$7,000 bail to get out of jail.

A locomotive runner on the Pittsburgh & Lake Erie made 45 days last month; and, in addition, received pay for 53 hours' overtime.

It is reported from Knoxville that the East Tennessee, Virginia & Georgia has notified its telegraph operators that they must resign their membership in the Order of Railway Telegraphers.

Freight car thieves have lately been arrested on the Arkansas Midland, the Union Pacific and the Philadelphia & Reading. The report of gigantic robberies on the Wabash, published by the newspapers last Sunday, proves to have been a "fake." It had the characteristics of one when it came out.

The seventh annual report of the Pennsylvania Railroad Voluntary Relief Association has just been made up. The membership is now 32,000, an increase of about 20 per cent. during the year. The fund which it is proposed to use for a pension fund now amounts to \$220,000.

In Jersey City, where there is a movement to abolish certain grade crossings on the Erie road, a record was recently kept, showing that from 8 a. m. to 8 p. m., 720 minutes, the number of trains passing Henderson street was 648, and the number of vehicles crossing the tracks 638. There are nine tracks at this crossing.

The Pennsylvania Railroad has bought for \$250,000 the southern half of the block bounded by Thirty-eighth and Thirty-ninth streets and Eleventh avenue and the Hudson River in New York City. About five years ago the company purchased all the adjoining block between Thirty-seventh and Thirty-eighth streets and Eleventh avenue and the Hudson River, but it has not yet been built upon.

British Honduras.

Sir Alfred Moloney, the Governor of British Honduras, in a speech on the various proposals for improving the means of internal communication in that colony, said that at present communication is confined to river courses and some 770 miles of roads of all kinds, which include nearly 500 miles of by-roads and trails. The area of the colony is 7,562 miles, and the population, which, in 1881, was 25,035, increased to 31,471 in 1891, or about 42 per square mile. A railroad has been projected from Belize to the Guatemalan border, some 60 miles due west, and surveys were made following the Sibun Valley for 35 miles, when it was decided that the physical difficulties encountered made further explorations a waste of time, and surveys up the valley of the Balize were run 35 miles also with so far a more favorable result. But all of the land on that river is in private hands, so that a land grant, which is desirable, is impracticable.

Lake Ore and Freights.

The probable freight rates for next season's business on the lakes are just now exciting a good deal of interest. With Bessemer pig selling in Pittsburgh between \$13 and \$13.25 per ton the pig iron producers feel that a low price for ore is imperative, and the ore miners think that vessel owners who are understood to have been making 25 per cent., since they were unable to make 33, ought to reduce freight rates. The ship owners say that the ice is very heavy in the lakes and the season will be short; that the cold weather has about cleared all of the coal docks on the upper lakes, and as the up coal traffic will be heavy, the time occupied in handling it will materially reduce the number of possible voyages with ore, and here they remark incidentally that coal freights will probably be above 40 cents. They call attention to the fact that a great deal of grain is to be transported in the spring, some fifty million bushels being now in store at lake ports, and aver that iron workers who have in the past supplied their wants for Bessemer ores from over-sea mines must either pay some 50 cents more freight money per ton, or buy Lake Superior ores, as the British freighters are being laid up with great unanimity and their crews discharged on the assertion that the rates they have been obtaining for some time are not remunerative. With these environments the opening rates on grain are still in doubt, and no sales of ore have been made public, although the Lake Erie ore docks are expected to be unusually bare at the opening of navigation. In the meantime nearly every shipyard on the lakes is full of business, with a very fair prospect for orders for next season.

The Railroad to Jerusalem.

The opening of the railroad from Jaffa to Jerusalem, which occurred on Sept. 26 last, has heretofore been noted in the *Railroad Gazette*. The following additional particulars are from a French exchange.

The line is 54 miles long, of 1-metre gauge, and trains run over it in three hours. The course of the road from Jaffa is first eastward across the plain to Ramleh, then Southeastward to the valley of the mountain stream Wady Sarar, which it follows nearly to Jerusalem. At a distance of 31 miles from Jaffa it takes a northeasterly direction, and along the stream has steep grades and sharp curves. The highest point, 2,452 ft. above the sea, is within 1 1/4 miles of Jerusalem. The Jerusalem station is at the Wurtemberg Templar colony near the Valley of Jehosaphat. A French company owns this road, and it was built by French engineers, with native, Italian and Austrian laborers. The rails and ties came from France, and the bridges, etc., were supplied by Eiffel. The engines are from the Baldwin Locomotive Works. The passenger cars from Belgium.

Suez Canal Traffic.

The traffic through the Suez Canal for 1892 was 3,559 vessels, which measured 7,712,023 net registered tons, a decrease of 11.3 per cent. in tonnage as compared with 1891. For the past six years the traffic through the St. Mary's Falls Canal and that of the Suez Canal has been as below:

St. Mary's Falls Canal.		Suez Canal.		
Number of	Net registered	Number of	Net registered	
vessels,	tons.	vessels,	tons.	
1887....	9,355	4,897,548	3,137	5,978,024
1888....	7,803	5,170,639	3,440	6,640,834
1889....	9,579	7,221,935	3,425	6,783,187
1890....	10,537	8,454,435	3,389	6,891,014
1891....	10,191	8,400,685	4,207	8,638,777
1892....	12,580	10,647,203	3,559	7,712,028

That is, for the past six years the aggregate of the tonnage passing through the canal out of Lake Superior has been greater than that of the tonnage through the Suez Canal. During this time the average tonnage of vessels passing through the "Soo" Canal has increased from 523.5 to 846.3 net tons or 61.6 per cent. Through the Suez for 1892 it was 2,167 tons, showing an increase of 15.2 per cent. in the average tonnage.

Wheat in India.

The first general memorandum on the wheat crop for the season 1892-93 is as follows: In Bombay condition is fair to good. In the Northwestern Provinces and Oudh germination has been generally very fair, but there as well as in the Punjab the success of the crop depends mainly upon the winter rains. In the Central Provinces prospects are exceedingly good. Owing to the heavy October rains there is plenty of moisture in the ground, making the crop almost independent of the winter rains. In Berar the season is favorable, and the crop will be a good one if no damage is caused by rain or frosts hereafter. Information regarding the wheat crop in Bengal is not yet available.—*Indian Engineer*.

The "Capitan Prat."

When the ignoble effort was being made to work up a war with Chili, one of the most important elements in the case was the possible appearance in the harbor of New York of the armor-clad "Capitan Prat." This vessel has been recently completed by the Forges et Chantiers de la Méditerranée, La Seyne, and the following details are given in *Industries*: She is 328 ft. long, 60 ft. 6 in. beam, and 19 ft. 9 in. deep, and is constructed of steel. Motive power of 12,000 H. P. with forced draught is supplied by triple-expansion engines. The armament of the vessel comprises four 24 cm. Canet guns of 38 calibres, mounted on Canet gun carriages and enclosed in barbette turrets, eight 12 cm. Canet quick-firing guns of 45 calibres, four 57 mm. Hotchkiss quick-firing guns, six 37 mm. Hotchkiss quick-firing guns, and five Aecles guns. Electricity has been adopted to a large extent as the motive power in the manœuvring of the guns and turrets. Three speed trials of the vessel have been carried out, the results of which are shown in the following table, the last trial being under forced draught:

Duration of trial.	Mean speed, knots.	No. of revolutions.	I. H. P.	Coal consumed, per hour.
6 hours.	17.42	104.18	8,493	1.31 lb.
6 "	17.825	110.591	9,648	1.575 lb.
2 1/4 "	18.316	118.17	12,150	1.575 lb.

The Great White City.

We believe that it was Mr. Bunner who first gave to the World's Fair buildings the name of the "Great White City," in his paper in *Scribner's Magazine*. At any rate the "White City" has the equipment of a model municipality. It has a combined water capacity of 54,000,000 gallons a day, and will soon have 100,000,000. It has 25 miles of water mains and 291 hydrants. A hundred more will be provided. There are 3 steam fire engines, 4 chemical engines, a ladder truck, water tower, 40 hose carts, 26,750 ft. of hose, 1,050 hand fire extinguishers, 2,500 fire pails, a steam fire boat, 65 firemen, 150 alarm boxes, 150 patrol telephones, 500 guards, complete electric light and sewerage systems, etc., etc. By the time the fair opens many of these facilities and equipments will be greatly increased and perfected.

Elevated Railroad Loop in Chicago.

Since the completion of the Chicago & South Side Elevated road in Chicago—the Alley road—the need of a down-town loop has been so much emphasized that a considerable number of local property owners in the centre of the city have taken up the matter, and have filed articles of incorporation under the title of the Central Elevated Railroad Company. The incorporators represent heavy owners of property in the down-town district. For the public this undoubtedly will be a great advantage, as the incorporators are men who have means and opportunity to push the work to completion without obstruction or delay. Both the Alley and the Metropolitan roads have had an opportunity to construct this loop, the temper of the public being such as to give them every assistance, but failing to do this, which in reality would have been a great advantage to them, the property-holders themselves have taken it up and the other roads will have to pay for the use of the tracks. As this is a short road, and one that will have an enormous traffic it will probably be very profitable from the start. It is reported that it will be operated by electric motors, but this, of course, is wholly dependent upon the development of such motors, to the point where they will be considered suitable, before the road is built. Without the loop the elevated roads now built and building would be very much handicapped. The capacity of the Alley road is now only about one-half what it would be with the loop. It is much to be regretted that the loop will probably not be completed before the opening of the World's Fair. The capacity of the Alley road can at present only be increased by improving and adding to the present terminals.

Profit Sharing at H. K. Porter & Co.'s.

H. K. Porter & Co., locomotive builders, of Pittsburgh, have just paid to their employes the eighth annual "distribution" of a share in the profits of the business. The letter to the employes says: "We are especially gratified that the amount distributed is not decreased, as we supposed it would have to be. The conditions of business the past year have been very trying, and in many respects discouraging. Prices were less throughout the year than in 1891, and the output for the first six months was very small. But as soon as the demand increased the output largely increased, and by your efficient co-operation, so soon as you had the opportunity to put it forth, we largely recovered the lost ground. This proves to us what we believed before, that practical co-operation is a positive benefit to every one of us, and that it pays us partly, if not fully, in the item of dollars and cents, to make this distribution. We have often

said to you that it is only on this basis that we can hope to make such distribution a permanent annual thing. But such reasonable return to us only makes us the more gratified to recognize your efficient and cheerful service, and to be able to give you this additional remuneration for your faithful labor. We hope that in receiving this sum, each one of you is conscious of having deserved it by having rendered the best service in his power; and that the money will be a positive good to each one, and to all dependent upon you.

"Hoping for your individual good in every way in the future, we remain, your friends, . . ."

Coal Mining in West Virginia.

The annual report of the Mine Inspectors of the state of West Virginia for the year 1892 gives interesting information concerning the coal industry of that Commonwealth. The development practically began in 1880, when the coal fields of West Virginia first began to attract the attention of outside capital and their product to find its way to outside markets. The production of coal for 1880 was 1,404,008 tons; in 1892 the production was 8,710,838 tons. In 1880 there were 3,773 miners employed, while in 1892 there were 15,393. The percentage of increase of production for 1891 and 1892 was greater than any previous two years, amounting to 43 per cent. The statistics of coke manufacture are equally interesting. In 1880 there were 621 ovens in operation and 40 buildings, and the production was 121,034 tons. In 1892 there were 5,490 ovens in operation and 770 in course of construction. The production for the year was 1,313,449 tons. In late years, particularly the last two, the railroad development has been very rapid. The building of the West Virginia Central & Pittsburgh road, the Norfolk & Western Ohio extension, the West Virginia & Pittsburgh, the extension by the Baltimore & Ohio of the Fairmont, Morgantown & Pittsburgh, the extension of the Kanawha & Michigan, and the extension and improvements of the Chesapeake & Ohio in the Kanawha and New River valleys, the rebuilding of the Grafton & Greenbrier by the Baltimore & Ohio, and the new railroad enterprises in that state, all of them of considerable promise, have all had for their main object the development of coal mines. Another important point is the fact that all these railroads not only develop the coal traffic but penetrate virgin forests of hardwood timber.

Collecting Railroad Taxes in South Carolina.

The sheriffs have lately attached cars and engines in South Carolina for non-payment of taxes, and in some cases have chained them to the track. The Governor, noted for his pugnacity on various questions, has taken an active part in the matter, and it is now under consideration in the United States Court at Charleston. The facts are summarized in a press dispatch as follows:

In the United States Court to-day (Feb. 13) the great railroad tax case of the South Carolina and Richmond & Danville Railroad companies against the sheriffs and treasurers of four counties was heard on both sides, but the argument has not yet been finished. . . . The litigation arose out of an attempt of the state to make an arbitrary assessment of the railroad property in the state. The railroads resisted and went into the United States Courts. An order was issued directing the roads to pay taxes on the usual assessment and to pay the difference into the court subject to determination of the suit. In the meantime the case was carried to the United States Supreme Court, where the matter involved was less than \$2,000, and therefore the court had no jurisdiction.

Soon after this Governor Tillman sent confidential circulars to all sheriffs and treasurers, directing them to levy and collect the extra taxes due. Obeying this order, several trains were seized on various railroads. The South Carolina and Richmond & Danville, which are operated by receivers, went before Judge Simonton, of the United States Circuit Court, and got out injunctions and attachments for contempt. The papers were served by United States marshals on sheriffs and treasurers, but these, acting under instructions from Governor Tillman, refused to obey the order or to release the property held by them. Then the railroads appealed to court, and, in order to avoid conflict, Judge Simonton issued an order fixing the hearing for to-day. Governor Tillman is very angry. He talks about the "ignorance and tyranny" of the United States judge, and is anxious to have the deputy marshals arrest his officers.

The Elevated Road Through Elizabeth.

Work on the Pennsylvania track elevation at Elizabeth, N. J., is progressing rapidly this winter. At the Broad street-Morris avenue crossing the foundations for the arches are completed except for one pier. Morris avenue has been permanently closed for traffic, and on the north side of the Central tracks ground has been broken for the depression of the street. The excavations are about completed at the West Jersey street crossing and the foundations at the Rahway avenue crossing are nearly finished. The trestle at the north end is complete and the rails are laid as far as the North Broad street crossing. At the south end the trestle is complete except at the street crossings, and rails are laid as far as the Pearl street crossing. The intention of the railroad company is to complete the elevation of the two east-bound tracks by erecting temporary trestle bridges at the street crossings and to have trains running over it as soon as possible, so that the two west-bound tracks can be raised. The foundations of the different crossing bridges will then be completed for the full width of the four tracks and the bridges erected on the side of the west-bound tracks. When the construction of the elevation of the west-bound tracks is completed permanently traffic will be thrown back to them and the crossing bridges extended for the full width of the elevation, and the filling in of the trestle on the east-bound side completed.

Probable British Pig Iron Production.

The Glasgow *Herald* estimates the British output of pig iron for 1892 at 6,400,000 tons, saying: "All the statistics are not yet available, but it is sufficiently approximate. In 1892 the British production was 8,498,257 tons, or two million tons greater than last year. The same figures for this country were 4,623,323 in 1892 and 9,157,000 tons last year, or a gain of about four and a half million tons.

McGill University.

The new Macdonald and Workman Engineering Buildings of the McGill University at Montreal will be opened by His Excellency, Lord Stanley, the Governor General, next Friday morning, Feb. 24. Many invitations have been sent out to persons, distinguished as engineers and otherwise, both in the United States and the Dominion. In the evening a conversation will be held in the engineering buildings.

Electricity in Spain.

Perhaps Madrid, Spain, is to have an underground electric railroad. At any rate a franchise for such a road has been granted to Don Pedro Garcia Faria for a period of 99 years. The road is to be made up of four sections, and only a single, short stretch is to be above the surface, and in that a viaduct is to be used. Construction work is to be commenced within a year. Eight years are to be allowed for completing the electric water power plant and the first section of the line; and four years are to be allowed for building each of the remaining sections. There is a certain beautiful, highbored deliberation about this plan, but in 20 years even Spaniards may be flying.

The Mule Shoe Curve.

District Passenger Agent Watt, of the Pennsylvania, has returned from a tour over the Oresson & Clearfield, the new 80-mile branch of the Pennsylvania. One of the features of the new line, in its sinuous course through the Alleghenies, is a curve similar to the famous "horse-shoe" bend in the main line, but which Colonel Watt thinks surpasses it. The rails make the grand bend on a grade of nearly 200 ft. to the mile, which is away ahead of the horseshoe. The Colonel calls the new bend the mule shoe.—*Pittsburgh Post.*

Rail Joints.

Mr. James M. Price, the inventor of the Price rail joints, delivered a lecture on Rail Joints, illustrated by lantern slides, before the members of the Franklin Institute at Philadelphia, on Feb. 15.

LOCOMOTIVE BUILDING.

The Brooks Locomotive Works has received from the Great Northern road a contract for building 45 engines.

The Boston & Maine railroad has let 12 moguls, 12 eight-wheel passenger and 6 four-wheel switching engines to the Manchester Locomotive Works.

The Delaware, Lackawanna & Western has placed an order with the Cooke Locomotive Works for two six-wheel and three eight-wheel passenger engines.

The Baldwin Locomotive Works has received a contract from the Long Island for building two six-wheel switching engines. This is in addition to the order for 20 engines referred to in our issue of Feb. 3.

The Cooke Locomotive Works are building for the Delaware, Lackawanna & Western Railroad a large 10-wheeled compound locomotive which it is expected will be put in service some time during the next two months.

The Central of New Jersey has awarded the contract to the Baldwin Locomotive Works for building 15 ten-wheel engines, five simple eight-wheel passenger engines, one compound passenger engine and five shifting engines.

The Illinois Central has recently ordered of the Rogers Locomotive Works eight suburban locomotives of the company's standard type, but considerably heavier and with a greater coal and water capacity. They are to have 17 x 24 in. cylinders, four wheels connected with a two-wheel leading truck and a six-wheel tender truck. They are designed to carry five tons of coal and 2,500 galls. of water. They are to have 45-in. straight top radial stay boilers with fireboxes 36 in. x 96 in., suitable for burning anthracite coal. The weight on drivers will be about 70,000 lbs. Total weight in working order 160,000 lbs. It is expected that a part of these engines will be delivered in the latter part of April.

CAR BUILDING.

The Long Island Railroad has placed an order for 20 passenger cars with the Jackson & Sharpe Car Company, of Wilmington, Del.

BRIDGE BUILDING.

Boston.—Sealed proposals for building two masonry bridges near Longwood avenue, on the Muddy River Improvement, for the Park Departments of the city of Boston and the town of Brookline, will be received at the office of the Clerk of the Park Commissioners, Town Hall, Brookline, until Feb. 27.

Brunswick, Md.—The Potomac River was clear of ice last Monday and the engineers began the work of establishing the grades for the new steel bridge at this point. The bridge is to take the place of one destroyed during the civil war. It will be 1,000 ft. in length, and will cost \$62,000. The Youngstown Bridge Co., of Youngstown, O., has the contract and the bridge is to be opened about July 1. The piers and abutments of the old bridge will be used for the new one, but iron columns 14 ft. high will be erected on top of the old piers for the superstructure.

Cincinnati, O.—The Bracket Bridge Co., of Cincinnati, O., has been formed for the building of bridges and the superintending of engineering and structural work in iron and steel. The incorporators are: F. J. P. Brackett, F. E. Morris, Glen Wright, R. L. Owens and John W. Herron.

The bill authorizing the construction of a third bridge between Covington and Cincinnati has passed both branches of the General Assembly of Kentucky.

Cleveland, O.—The report of Engineer Walter P. Rice, to whom the report of Engineer Osborn in regard to the Brooklyn-Brighton bridge was referred, has been received by the County Commissioner. Engineer Rice agrees with Mr. Osborn in recommending that a new structure be erected to replace the present bridge, which he considers to be in a dangerous condition.

Cuyahoga County, O.—There has been considerable discussion in the Ohio Legislature over the bill to authorize the commissioners of this county to issue \$300,000 in bonds for bridge purposes. The bill is still pending.

Elgin Corner, N. B.—Chief Commissioner of Public Works Emerson has inspected the foundations of the new iron bridge at this place. The bridge will have a span of 124 ft. and, when completed will cost about \$5,000. Messrs. Hansom, of Woodstock, are the contractors for the stone piers.

Grantsville, W. Va.—A proposition is before the County Court of Calhoun County, W. Va., at Grantsville, for the building of a steel highway bridge over the Little Kanawha River at that point. Public sentiment favors the bridge and the indications are that it will be built the coming summer.

Lambton County, Ont.—At the January session of the Lambton County Council a by-law was passed to

raise \$4,000 to provide for an iron bridge to be built over the Sydenham River at Warner's mill.

New York City.—The Department of Public Works will invite tenders soon for the construction of the proposed drawbridge over the Harlem River Ship Canal, at Broadway or Kingsbridge Road, New York. The work will consist of a draw 266 ft. c. to c. of end piers, and of two deck approach spans of 100 ft. each. Earth embankments will lead from each end up to the bridge, which will give a clearance of 26 ft. above m. h. w. The appropriation for the improvement is \$400,000.

Plymouth, Pa.—A charter was granted last week to the Hanover Bridge Co., of Wilkes-Barre, to erect a bridge over the Susquehanna River at Plymouth. Capital, \$8,000.

Portland & Rumford Falls.—This road will put in new iron bridges at Buckfield, Sumner and Gilbertville, Me., in the spring.

Thomaston, Tex.—The Commissioners Court has been petitioned to build a new bridge over the Guadalupe River at Thomaston.

Wilkes-Barre, Pa.—The Hanover Bridge Co., of Wilkes-Barre, has been chartered at Harrisburg, Pa., with a capital of \$8,000. It will bridge the Susquehanna River between Plymouth and Hanover Township.

Winnipeg, Man.—The contract for the erection of the bridge across the Red River to be built for the Norwood Improvement Co. will be let shortly. The cost will be about \$60,000. The plans have been approved of by the company, and as soon as some minor details are arranged the contract will be signed.

RAILROAD LAW—NOTES OF DECISIONS.**Powers, Liabilities and Regulation of Railroads.**

The Supreme Court of New York holds that a railroad whose only business within the state is discharging freight and passengers brought over its line from without the state, and receiving freight and passengers to be sent out of the state over its line, and incidentally maintaining terminal facilities, employing clerks, and keeping a bank account, cannot be taxed by the state on its business, this being interstate commerce.¹

The Texas statute of 1891, section 4, provides that the State Railroad Commission shall give notice and hearing to railroad companies to be affected before establishing any rates. Notice that on a specified day the classification of freight and fixing of rates would be begun having been given, the representatives of the companies appeared, and the question of classification and rates was discussed in general, but no particular rates or changes from existing rates were proposed. Thereafter, and without further hearing, the commission proceeded to prescribe rates from time to time, and put them in force. The Federal Court rules that these proceedings did not constitute "due process of law," and the rates fixed were void, under the constitution of the United States.²

In the same case other sections of the same act were considered by the same court. Section 5 provides that in all actions between private parties and railroad companies, the rates and classifications prescribed by the State Railroad Commission before the institution of such action shall be conclusive, and deemed and accepted to be reasonable and just, and in such respects shall not be controverted until finally found otherwise in a direct action brought for that purpose in the manner prescribed by Sections 6 and 7. Section 6 provides for actions by railroad companies against the commissioners for the purpose of testing the reasonableness of the rates prescribed, and Section 7 declares that in all such actions the burden shall be upon the companies to show that such rates are unreasonable and unjust. The Court holds that Section 5, and all other provisions of the law which tend to enforce a compliance with the rates fixed by the Commission, irrespective of their reasonableness, or tend to embarrass such roads as seek to invoke the protection of the United States constitution against the taking of their property without due process of law, are unconstitutional.³

In New York it is held by the Court of Appeals that the statute of 1884 authorizing the Supreme Court or County Judge, on application of the local authorities, and on notice to a railroad corporation whose road crosses a street, highway, etc., to order that a flagman be stationed, or gates be erected, at such crossing, is not unconstitutional as a delegation of legislative power to the judges; its purpose being merely to provide a means to determine the necessity of a flagman or a gate at any particular place.⁴

In Missouri a city authorized a railroad to construct and operate its road along a certain street of the city 100 ft. wide. Afterwards it authorized another railroad company to construct and operate its road along the same street, provided its plan of route and tracks did not injure the tracks laid and sidetracks unalaid of the first named company. The plan of the second named company was to construct its road along and across said street and the tracks of the first named company. The Supreme Court holds that the second named company had a right so to do, under a statute providing that between any points in the state any railroad company can cross the tracks of any other railroad company, and cross any city street with the assent of the city authorities.⁵

In Kentucky a railway company was incorporated under a statute which provides "that all persons residing in this state, and owning stock in said road, shall give said stock in for taxation under the equalization laws of this state from and after the completion of the road; but no further tax shall be imposed on said company or road." The Court of Appeals, in an action by the state to recover taxes on that part of the road lying within the state, that an absolute transfer by such company of all its property to another company for 1,000 years, and in consideration that the road be completed within a certain time, was equivalent to a sale, and did not pass the right of exemption from taxation contained in the charter of the original company.⁶

In Pennsylvania it is laid down by the Supreme Court that where the right of way and the franchises of a railroad company are sold as an entirety by a receiver duly authorized, the company cannot maintain ejectment against the purchaser for a part only of such right of way, though there may have been fraud practiced by the purchaser at the sale.⁷

Carriers of Goods and Injuries to Property.

In Indiana, the Supreme Court rules that where a shipper asks for cars to be furnished on a day mentioned in the future for transportation of live stock, and the carrier agrees to furnish same, such agreement rests upon a valid consideration, and is binding on the carrier

as well as the shipper, notwithstanding the shipper may not have owned or had any stock at the time the agreement was entered into.⁸

The Supreme Court of Ohio decides that a contract, whereby a railroad company binds itself to carry for one shipper crude petroleum at half the rate it agrees to charge all others and to pay such favored shipper one-half the amount collected from others in consideration of his agreeing to establish and maintain a system of pipe lines to its road, is void and money so paid by a shipper in ignorance of an agreement and received by the favored shipper may be recovered back in an action for money had and received by the former against the latter.⁹

In a case in the Federal Court it appears that freight rates from London and Liverpool to San Francisco are fixed by the competition of the water and rail route via the Isthmus of Panama and the water route around Cape Horn. A carrier by rail from New Orleans to San Francisco gave a much lower rate on goods shipped from London and Liverpool to San Francisco on through bills of lading than from New York, Chicago, and other points to San Francisco (in some cases less than half the latter rate). The rate complained of was slightly remunerative to the carrier, and it would lose the traffic unless it carried at such low rate. The Court rules that under sections two and three of the interstate commerce act the giving of such low rate is an unjust discrimination, and a charging of one person more than another for a like service under substantially similar circumstances and conditions, and an order of the commissioners prohibiting it will be enforced.¹⁰

- ¹ People v. Wemple, 20 N. Y. S., 287.
- ² Merc. Trust Co. v. Texas & P. Ry. Co., 51 Fed. Rep., 529.
- ³ Id.
- ⁴ People v. Long Island R. Co., 31 N. C. Rep., 873.
- ⁵ St. Louis Transfer Ry. Co. v. St. Louis M. B. & T. Ry. Co., 20 S. W. Rep., 319.
- ⁶ Com. v. N. C. & St. L. Ry. Co., 20 S. W. Rep., 383.
- ⁷ New Castle N. Ry. Co. v. N. C. & St. L. Ry. Co., 25 Atl. Rep., 100.
- ⁸ P. C. C. & St. L. R. Co. v. Racer (Ind. App.), 31 N. E., 863.
- ⁹ Hundred v. Rice, 32 N. E. Rep., 169.
- ¹⁰ Interstate Com. Com. v. T. & P. Ry. Co., 52 Fed. Rep., 187.

MEETINGS AND ANNOUNCEMENTS.**Dividends:**

Dividends on the capital stocks of railroad companies have been declared as follows:

- Boston & Maine*, semi-annual, 3 per cent. on the preferred stock, payable March 1.
- Chicago, Burlington & Quincy*, quarterly, 1½ per cent., payable March 5.
- North Pennsylvania*, quarterly, 2 per cent., payable Feb. 25.
- West Virginia, Central & Pittsburgh*, annual, 1 per cent., payable March 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Atlanta & Charlotte Air Line*, annual, New York City, March 8.
- Barclay*, annual, Philadelphia, Pa., Feb. 18.
- Delaware, Lackawanna & Western*, annual, New York City, Feb. 21.
- Missouri Pacific*, annual, New York City, March 14.
- New York, Lackawanna & Western*, annual, New York City, Feb. 21.
- New York, Susquehanna & Western*, annual, Jersey City, N. J., March 9.
- Norfolk & Southern*, annual, Norfolk, Va., March 2.
- Pittsburgh, Cincinnati, Chicago & St. Louis*, annual, Pittsburgh, Pa., April 11.
- St. Louis, Iron Mountain & Southern*, annual, New York City, March 14.
- Texas & Pacific*, annual, New York City, March 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

- The *Freight Claim Association* will hold its semi-annual meeting in St. Louis, Mo., March 8, at the Southern Hotel.
- The *New England Railroad Club* holds regular meetings at the United States Hotel, Beach street, Boston, Mass., on the second Wednesday of each alternate month, commencing January.
- The *Western Railway Club* holds regular meetings on the third Thursday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.
- The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at 7:30 p. m., at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.
- The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.
- The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.
- The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.
- The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.
- The *Boston Society of Civil Engineers* holds its regular meetings at Wesleyan Hall, Bromfield street, Boston, at 7:30 p. m., on the third Wednesday in each month.
- The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.
- The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.
- The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month. The annual meeting is held on the third Saturday in January.
- The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.
- The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.
- The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-

monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month, except during July, August and December, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Association of Engineers of Virginia* holds informal meetings the third Wednesday of each month, from September to May inclusive, at 8 p. m., at the room of the Association, 710 Terry Building, Roanoke.

American Society of Civil Engineers.

The secretary has sent out a circular calling for volunteers to translate papers for the Engineering Congress of the World's Fair. Papers have been promised in five continental languages, and it is desirable to have them translated by persons familiar with the subjects of which they treat. The secretary asks, therefore, that those who are willing to undertake translation will inform him of the language from which they will translate, the class of papers and their number.

Civil Engineers' Society of St. Paul.

The regular monthly meeting of the Civil Engineers' Society of St. Paul was held on Feb. 6, at 8 p. m.; 16 members and 6 visitors in attendance. Messrs. Loweth, Morris and Stevens were named as a committee to consider the question of interchange of members. It was unanimously resolved that the United States Senators and Representatives in Congress for the State of Minnesota, also the chairmen of committees to which has been referred the bill appropriating \$40,000 for the continuance of the United States timber tests by the Forestry Division of the Agricultural Department be advised, by the president and secretary of this society, of the far-reaching benefits to the public and to the engineering profession which, in the judgment of the society, the passage of this bill would procure.

A paper on "Railroad Building in Mexico," was read by Mr. W. H. Wood. At present nine-tenths of Mexican imports enter via Vera Cruz. This port has no docks. All traffic must be transferred by lighters. The recent harbor improvements at Tampico and the proposed direct line of railroad to that port from the city of Mexico will probably divert much traffic to the new route. Deep water, docks, climate, railroad grades and facilities will all be in favor of Tampico.

Mr. Charles Steiner read the paper on the utilization of the Minnehaha water power previously presented before the Minneapolis Engineers' Club.

The Southern & Southwestern Railway Club.

The next meeting of the club will take place at the Kimball House, Atlanta, Ga., on April 20, 1898, at 10 o'clock a. m. The subjects for discussion will be: (1st.) "Air Brake Practice; Piston Travel in Inches, and Determination of the Actual and Available Brake Power;" with Messrs. W. J. Hartman, J. M. Holt and R. E. Libby, as a special committee. (2nd.) "What Are the Best Devices and Appliances in Draft Rigging and Drawbars to Prevent Damages and Wrecks, and Reduce Maintenance of Those Parts," with Messrs. R. D. Wade, C. B. Gifford and F. H. McGee, as a special committee. (3rd.) "Soft Plugs for Crown-Sheets of Fireboxes; Best Form and How to Keep Them Effective," with Messrs. Phillip Wallis, T. W. Gentry, W. Hassman and W. T. Hooker, as a special committee. The committee on "Stay-Bolts Inspection," R. P. C. Sanderson, chairman, is expected to make a report.

Western Railway Club.

The next regular monthly meeting of the Western Railway Club will be held in room 850, The Rookery, Chicago, on Tuesday, Feb. 21, at 2 o'clock, p. m. The paper of Mr. G. W. Rhodes on "Wheel Flanges," read at the January meeting will be discussed, and Mr. William Forsyth, mechanical engineer of the Burlington will read a paper on Tests of Locomotives in Heavy Express Passenger Service.

PERSONAL.

—Mr. Isaac H. McEwen, Assistant Superintendent of the Rome, Watertown & Ogdensburg, has resigned and it is announced that the vacancy will not be filled.

—Mr. William G. Primrose, Superintendent of Bridge Building for the Baltimore & Ohio railroad, and who put up its first iron bridge, died at Baltimore, Md., last week, aged 67 years.

—Mr. Albert Rokusek, formerly General Freight & Passenger Agent of the Cleveland, Canton & Southern, has been appointed Manager of the Chicago & Wellston Coal Co., with headquarters at Clark and Fourteenth streets, Chicago, Ill.

—Mr. John E. Rose, formerly Superintendent of Transportation on the Cleveland, Cincinnati, Chicago & St. Louis, has accepted the position of Manager of lead

mines in Wisconsin, in which a number of Indianapolis citizens are interested.

—A lecture was delivered Feb. 9, before the students of the Rensselaer Polytechnic Institute, by Alfred P. Boller, of the class of 1881, on the Substructure and Approaches of the new Central Bridge over the Harlem River at 155th street, New York.

—Mr. P. N. Fox, who was for many years General Freight Agent of the Louisville, New Albany & Chicago road, died at Evanston, Ill., Feb. 9. Mr. Fox was of late years Superintendent of Transportation of the American Cotton Seed Oil Transportation Co.

—Mr. John J. MacDonald, a leading Canadian contractor, died at Montreal, Feb. 9, aged 57 years. He was connected with the execution of some of the largest railroad contracts in the Dominion, including the Inter-Colonial and the Canadian Pacific railroads.

—Mr. William Renshaw, who for several years past has held the position of Assistant Superintendent of Machinery of the Illinois Central Railroad Company, has been appointed Superintendent of Machinery in place of Mr. Henry Schlacks, who lately resigned.

—Col. M. V. B. Edgerly, President of the Massachusetts Mutual Life Insurance Company, of Springfield, Mass., is to be the new President of the Connecticut River road. Colonel Edgerly is a director of the company and has been President of a number of Western railroads.

—Mr. Edwin A. Hill, at present real estate agent of the Cleveland, Cincinnati, Chicago & St. Louis road, and formerly Chief Engineer of the Indianapolis, Decatur & Springfield road, has accepted a position with the banking house of Hatch & Foote, in New York City, as railroad expert.

—Mr. Daniel R. Cofrode, President of the Citizens' National Bank of Pottstown, Pa., died in that town on Feb. 3, 52 years old. Mr. Cofrode was for many years superintendent of the Philadelphia Bridge Works of Cofrode & Saylor, in which his brother, Joseph H. Cofrode, is largely interested.

—Mr. Allen Cooke has been appointed Master Mechanic of the Chicago & Eastern Illinois road, with headquarters at Danville, Ill. Mr. Cooke was formerly connected with the company in this capacity for a number of years, resigning two years ago when the management was changed.

—Mr. G. R. Hardy, formerly Assistant Chief Engineer of the Boston & Albany, and later with the Lake Shore & Michigan Southern and with the Westinghouse Electric & Mfg. Company, is now on the New York, New Haven & Hartford. He is engaged in the extensive improvements on the New York Division.

—Messrs. John Hall, P. B. Maxon and W. D. Vincent have been chosen Railroad Commissioners of Kansas, but these offices are among those mixed up in the political strife which is now creating a disturbance there, and one or more of the present commissioners announce their intention of holding their positions for a year or two longer at all hazards.

—Mr. J. C. Park, Locomotive Superintendent of the North London road (England), and formerly Master Mechanic of the Buffalo & Lake Huron (Canada), has resigned owing to ill health. Mr. Park was a most capable engineer, and, though his line was only 12 miles long, built all the locomotives and rolling stock in remarkably clean and well organized shops at Bow.

—Maj. Richard Randolph, of Baltimore, died in that city Feb. 10, while reading in the Mercantile Library. Major Randolph several years ago had charge of the engineering work on the Valley and Metropolitan branches of the Baltimore & Ohio. He had charge of the construction of the Baltimore Belt Tunnel until a few months ago, when he was succeeded by Mr. W. T. Manning, of the Baltimore & Ohio. He was then made consulting engineer.

—Mr. Josephus Collett, a well known capitalist of Terre Haute, Ind., died in that city Feb. 13, of spinal trouble, aged 68 years. He built, in 1870, the Evansville, Terre Haute & Chicago road, from Danville to Terre Haute, which is now a part of the Chicago & Eastern Illinois main line, and also built the Columbus & Sandy Creek railroad into the Hocking Valley coal region. In late years he has been president of several proposed roads in Indiana and Illinois.

—Mr. John Moncure Robinson, President of the roads forming the Seaboard Air Line, died at his home in Baltimore, Feb. 14, of rheumatism, complicated with an affection of the kidneys. Mr. Robinson was born in Philadelphia, Aug. 22, 1835. He was a son of the late Moncure Robinson, one of the originators and promoters of the Richmond, Fredericksburg & Potomac Railroad. John M. Robinson, after passing through the Virginia Military Institute, continued his studies at the Lawrence Scientific School and Harvard University, and studied civil engineering. Mr. Robinson attached himself to the engineering corps of the Confederate States when the civil war broke out, and rose to the rank of colonel and served as a staff officer. Just before the close of the war he was in charge of railroad transportation for the Confederacy. Mr. Robinson was for some time Superintendent of the Seaboard & Roanoke Railroad, and at the time of his death was President of the road and of the Baltimore Steam Packet Co., Raleigh & Gaston Railroad and Augusta Railroad.

—Dr. Norvin Green, President of the Western Union Telegraph Co., died at his home in Louisville, Ky., Feb. 12, after an illness of about one week's duration. Dr. Green was born in New Albany, Ind., on April 17, 1818, and at the age of 16 ran a floating grocery on the Mississippi. Later he obtained a contract to chop a large quantity of cordwood, and thereby accumulated enough money to pay for a medical education. He was graduated in 1840, and practiced as a physician for several years in Louisville. Subsequently he was elected to the Kentucky Legislature. In 1853 he was appointed a United States Commissioner in charge of building the Custom House and Post Office in Louisville, and at that time became one of the lessees of the United Morse and People's telegraph lines between Louisville and New Orleans. This was the beginning of his association with the telegraph. He was chosen President of the Southwestern Telegraph Co. on its incorporation soon afterward. When that company was merged in the American Telegraph Co., which became, in turn, a part of the Western Union, Dr. Green was made a Vice-President. When the American, United States and Western Union lines were consolidated, in 1880, Dr. Green was chosen Vice-President. He occupied the office of Vice-President of the Western

Union until April 23, 1878, when he succeeded William Orton in the Presidency.

—William Holmes Chambers Bartlett died at his home in Yonkers, N. Y., last Saturday morning, and many a good man throughout the United States will be sorry to hear of the death of "Old Bart," and many a scholar throughout the civilized world will be surprised to find that he was alive only a week ago; for Professor Bartlett was more than 40 years a powerful influence in educating the officers of the United States Army, and 40 years ago had written books which gave him a very high place among mathematicians. In the introduction to one of his books he says (we quote from memory), "The man who is endowed with the priceless gift of a copious mathematics possesses the key to the external universe." This gift Professor Bartlett had to an extraordinary degree, as those know who have read his "Analytical Mechanics," "Spherical Astronomy" and "Synthetical Mechanics." The analyses to be found in these books of the most abstruse problems in mechanics are frequently very original and beautiful. They are hard reading; but few men could read them with any comfort 10 years after leaving college. In fact, the boys at West Point used to have a saying with regard to certain equations in Analytical Mechanics "that Old Bart himself once knew how to integrate them, but nobody else did."

Professor Bartlett was born in Pennsylvania, Sept. 4, 1804, and graduated at the head of his class at West Point in 1820. He entered the engineer corps at once and was made Assistant Professor of Engineering at West Point. He served there two years, then for seven years was engaged on other duty, and in 1836 was appointed Professor of Natural and Experimental Philosophy at West Point where he remained until 1871, when he was placed on the retired list of the army with rank of Colonel. From 1871 until 1888 he was Actuary of the Mutual Life Insurance Company in New York City. In the latter year he was practically retired from active work although he retained the honorary position of Advisory Actuary in the Mutual Life. The following extract from the resolutions passed by the Directors of that company at the time of his retirement from active service there will give some notion of his attainments and the esteem in which he was held: "Prof. Bartlett brought to the service of this company ability of the highest order, rendered more conspicuous by long-continued training and an experience as an instructor in the higher branches of intellectual culture which very few have attained, and after the conclusion of a career as brilliant as it was useful in the service of the nation he brought his reputation and his learning to the service of this company as its Actuary. His discharge of the duties of his new position was characterized by the same phenomenal intellectual capacity for which he had been distinguished as a teacher and author, and by the same conscientious attention to every detail, which was a prominent trait in his character. Eminent in the very highest degree as an actuary and mathematician, he combined with the attainments of the man of science the gentleness and courtesy of a true soldier and gentleman." He was a master of arts (Princeton), doctor of laws (Hobart and Columbia), and had been honored by many learned societies.

ELECTIONS AND APPOINTMENTS.

Adirondack & St. Lawrence.—Edward Heise has been appointed Master Mechanic with office at Herkimer, N. Y. He has been a conductor on the West Shore and was formerly a locomotive engineer.

Baltimore & Ohio.—J. Van Smith, Superintendent of the Philadelphia Division, whose headquarters are at Twenty-fourth and Chestnut streets, has been appointed General Agent of the road at Philadelphia. He will be the authorized representative of the executive department of the company at Philadelphia.

Cleveland, Port Stanley & London.—Robert Larmour, formerly with the Grand Trunk as Division Superintendent, and lately with the Commercial Express as General Agent, has been appointed Superintendent of this road, with offices at London, Ont.

Duluth, Messabe & Northern.—At the annual election, held in Duluth, Minn., last week, the following officers were elected: President, Alfred Merritt, to succeed K. D. Chase, resigned; Vice-President, Leonidas Merritt. The directors elected are Alfred Merritt, A. D. Thompson, W. W. Henry, C. C. Merritt, Leonidas Merritt, S. R. Payne, A. R. Merritt and N. B. Merritt.

Flint & Pere Marquette.—The following appointments have been made: W. Henderson, Commercial Agent, in charge of freight matters, at Detroit; H. F. Moeller, District Passenger Agent, Detroit City, both with office at 11 Fort street, west, Hammond Building, Detroit. F. E. Parker, Commercial Agent, Saginaw Valley, with office at Saginaw and Crapo Building, Bay City.

Interoceanic.—Loftus J. Nunn has been appointed General Freight and Passenger Agent, with headquarters at the City of Mexico.

Mexican Central.—E. V. Sedgwick, Master Mechanic, has been transferred from the Tampico Division to the Chihuahua Division South, with headquarters at Jimulco, Mex.; vice Thomas Smethurst, transferred to other duties. The duties of D. M. Haynes, Master Mechanic of the San Luis Division South, will be extended over the San Luis Division North, his jurisdiction reaching from Chicalote to Tampico, Mex.

New York & Massachusetts.—William H. Sheldon, of Poughkeepsie, N. Y., has been appointed receiver of this road on application of a judgment creditor for a local claim.

New York & New England.—Henry W. Hammond, who has been for many years connected with the Utica & Black River and Rome, Watertown & Ogdensburg roads, for some time as a division superintendent, has been appointed as Division Superintendent of this road.

Ohio Southern.—W. L. Doyle, formerly Auditor of the Western New York & Pennsylvania, has been appointed Auditor and Assistant Secretary of this road, with headquarters at Springfield, O.

Philadelphia & Reading.—G. D. Whitcomb, who for some time has been Superintendent of the Reading Division, has resigned, and is succeeded by Wellington Beriolet, formerly Superintendent of the Shamokin Division. His headquarters will be at Reading, Pa.

C. W. Sheldon & Co. have been appointed import agents of the system to look after foreign traffic imported through the ports of Philadelphia and New York.

Reading & Southwestern.—At a meeting at Reading, Pa., Feb. 14, George W. Keim, formerly of Philadelphia, was re-elected Superintendent, and V. S. Seltzer was elected Secretary and Treasurer. A. K. Burk, of Philadelphia, resigned as director, and Henry C. Geissler was chosen his successor.

Silver Springs, Ocala & Gulf.—Notice has been given of the appointment of B. R. Swoope as Superintendent of this company, to fill the vacancy occasioned by the resignation of O. G. Finch. Also notice is given of the appointment of C. D. Owens as Traffic Manager of this company, and of the resignation of J. O. Clarke as its General Freight and Passenger Agent. The Board of Directors of this company has elected J. Moultrie Lee Treasurer, to fill the vacancy occasioned by the resignation of Dr. J. B. Upham.

Tuscarora Valley.—The annual election was held in Port Royal, Pa. Thomas S. Moorehead was elected President, C. P. Tiers Vice-President and Treasurer, J. C. Moorehead Superintendent and Secretary, and C. P. Tiers, T. S. Moorehead, John Caldwell, L. B. Fonda, H. R. Frick, Directors.

Waynesburg & Washington.—At the annual meeting held Feb. 7 these directors were elected: J. E. Davidson, W. Mullins, T. D. Messler, James McCrea, J. T. Brooks, J. J. Brooks, J. F. Temple, Abner Sharp, W. T. Lantz, Jacob Swart, Jonathan Allison, John P. Green, J. B. Roberts, of Philadelphia, was elected President.

Wheeling & Lake Erie.—F. S. Deal, private secretary to General Superintendent Woodford, has been appointed Purchasing Agent and Superintendent of Telegraph of the road.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Alabama Roads.—Bills to incorporate the following railroad companies are pending in the Alabama Legislature: The Demopolis & Myrtlewood, the Mobile & West Alabama, the Mobile & Florence, and the Dauphin Island & West Point.

Aspen & Maroon.—This company has been recently organized at Aspen, Col., to construct a road from Aspen to Maroon Creek and up the creek, a distance of 18 miles. The capital is placed at \$500,000. Walter S. Clark, Henry W. Stormer, Charles E. Shriver, J. E. Freeman, William O'Brien and H. C. Rogers, of Aspen, and H. C. Bates, of Denver, are the directors.

Baltimore & Cumberland.—The local papers report that work will be commenced on this road early in the spring, the decision to construct the road as soon as possible having been made at a recent conference in Philadelphia between President T. B. Kennedy, of the Cumberland Valley road, and Henry G. Davis, President of the West Virginia, Central & Pittsburgh. The survey of the line between Cumberland and Hagerstown, Md., first made in 1891, was revised last year, the present route being about 70 miles long and following the Potomac River. The construction of the new line will give the West Virginia, Central & Pittsburgh an eastern outlet for its coal business through the connection with the Cumberland Valley road north of Hagerstown. Chauncey Ives, of Cumberland, is Chief Engineer, and C. M. Hendley, of Baltimore, Secretary.

Baltimore & Harrisburg.—The bridge on the York branch from Porter's Siding to York, Pa., spanning the Philadelphia & Reading tracks below Spring Forge, has been completed, and work on the east bridge that is to span a small stream about four miles from York, is now being pushed. The trestle builders have completed their work and tracklaying is now going on toward York, which is 14 miles northeast of Porter's, on the Western Maryland.

Baltimore & Lehigh.—Heavy timbers are being distributed along the line of the road to be used in strengthening and rebuilding the trestles in order to carry the heavier engines and cars when the road is made of standard gauge. New ties are also being distributed along the road. Mr. W. R. Crumpton, General Manager, recently made a tour of inspection of the road with a number of contractors. William Gilmor, Receiver, has asked to be discharged, the claims against the road having been adjusted. The property will probably be transferred on March 1, and after that the standard gauging will be actively pushed.

British Columbia Roads.—Application has been made to the legislature of this province for a charter to incorporate a company to construct a road from the townsite of Cascade City, Osoyoos Division of Yale District, northerly along the east shore of Christina Lake, and to the Columbia River, to Trail Creek, with branch lines, to a point on the present line of the Columbia & Kootenay road near Robson, B. C.

British Columbia Southern.—A party of surveyors, in charge of Johannes Graff, is reported in the field making surveys for this road. The party is endeavoring to find a feasible route across the Parcel range to the Kootenay region in British Columbia.

Burlington & Missouri River.—The company has decided to build an extension from its Deadwood line to the town of Spearfish, S. D., in the Black Hills. The new line will be about 28 miles long, beginning at Englewood, S. D., and extending in a northwesterly direction through the Black Hills to Spearfish. The entire line has been located and the contract for the grading let to Kilpatrick Brothers, of Lincoln, Neb. The work will, of course, be very heavy. The maximum grade will be 211 ft. to the mile and the maximum curves 16 degrees.

Burlington & Northwestern.—This company has applied to the North Carolina Legislature for a charter to construct a line from a point in Alamance County to a point on the Cape Fear River in Yadkin County.

Burrard Inlet & Fraser River Valley.—The report that the contract for building this road had been let to Dickinson & Co., contractors, of Tacoma, Wash., is confirmed. It appears, however, that no definite time has been set for beginning work, and that the building of the line will depend entirely upon the result of the litigation in which the projectors are already involved. The road is to extend from Sumas, a point on the Seattle, Lake Shore & Eastern, operated by the Northern Pacific, northwest to Vancouver, B. C. Last summer the town of Vancouver voted a subsidy of \$300,000 to the company, but the legality of this action is questioned and the matter has been brought before the courts. The firm which has the contract for building the line has had large contracts on the Northern Pacific, and is composed of Percy Dickinson, H. S. Huson, formerly Assistant Engineer of the Northern Pacific, and J. Q. Barlow.

Canadian Pacific.—General Superintendent H. Abbott, of the Pacific Division of the Canadian Pacific, has recently returned to Vancouver from Montreal, and it is reported that while East he was authorized to begin work on a branch from the main line near Revelstoke, B. C., southward along the Arrow Lakes to a junction with the Columbia & Kootenay, the line from the Columbia River to Nelson, B. C., on Kootenay Lake. This new road is designed to give all rail communication from the main line and Nelson and intermediate points. Nelson is at present the centre of trade for the Kootenay mining region, in the southern part of British Columbia.

Carthage & Western.—A bill granting a special charter to this company has passed the North Carolina Legislature. The road is to extend from Carthage to Currieville and thence through Moore County, in which both those towns are situated, for a distance of 20 miles.

Clearfield & Mahoning.—The track-laying on this new branch of the Buffalo, Rochester & Pittsburgh which was begun early in January has been completed for six or eight miles, and construction trains are running as far as Luthersburg, Pa. This extension is being built from Jefferson Line station, three miles south of Dubois, Pa., easterly across Clearfield County, to connect with the Beech Creek road at Clearfield, Pa., 26 miles. The Chief Engineer is J. M. Floesch, of Clearfield, Pa.

Gainesville, Tallahassee & Western.—J. M. Mayo, who made the surveys for this Florida road two years ago, is endeavoring to reorganize the company so that work can be resumed this year. The line has been surveyed between Gainesville and Tallahassee, Fla., and about 20 miles of the road is graded from Gainesville northwest toward Micanopy, Fla.

Golden & Pacific.—This company was incorporated in Colorado last week to build a road from Morrison, the terminus of a branch of the Union Pacific, north to Ralston Junction, near Golden, Col., a town west of Denver. The new line is about 14 miles long, and begins at the mines of the Denver Coal Co., extending through a well developed farming country. The capital is \$100,000. Charles C. Parsons, Samuel Newhouse, Frank E. Gove, George C. Moore and Ancel Newhouse, of Denver, are the directors.

Grand Trunk.—The cut off from Kingscourt, Ont., on the Sarnia line south to Glencoe, Ont., on the Detroit line, has been completed and trains began running over the new branch, which is 22 miles long, last week.

Kanawha & Michigan.—A local paper at Athens, O., is authority for the statement that the company will build a 10-mile extension to Pomeroy, O., next summer, to gain access to the coal and salt freights of that section.

Kansas City, Pittsburgh & Gulf.—President E. L. Martin has informed a committee of business men of Nevada, Mo., that he will build a branch from Richard to Nevada if the company is guaranteed the right of way. The distance is 12 miles. The line will be surveyed at once.

Lehigh & Pavillion.—The articles of incorporation for this company were issued at Albany, N. Y., last week. The charter is for a line about five miles long from the village of Lehigh, in Genesee County, south to the town of Pavillion, N. Y., connecting with the Buffalo, Rochester & Pittsburgh at the former place, and with the Delaware, Lackawanna & Western near Pavillion. The road is already practically completed, having been built by the Lehigh Salt Mining Co., of Scranton, Pa., which has mines at Le Roy, N. Y. E. L. Fulton, of Scranton, is President, and among the other directors R. H. Sayre, of South Bethlehem, Pa., and A. C. Yates, of Rochester, N. Y.

Louisville & Nashville.—President Smith has awarded the contract for the construction of the twelve mile "Log Mountain" branch, up Clear Creek, in Bell county, Ky., leaving the Cumberland Valley division near Pineville. James Coyne & Co., of Louisville, are the contractors, who will, it is announced, put several hundred men at work immediately. It is expected to have the line in operation by June 1. The route was surveyed and located last fall. The road is intended to develop the properties of the Log Mountain Coal, Coke & Timber Co., which has 20,000 acres along Clear Creek. Maj. G. D. Fitzhugh, for 15 years Consulting Engineer of the Louisville & Nashville, is Engineer and Manager of the mines of the new company.

Mexican International.—Some details of the construction work on the extension from Monclovia, Mex., on the main line, 238 miles south of Eagle Pass, Tex., west to the Sierra Mojada mining district, 160 miles, are given in a letter to the New York Times. The construction work is in charge of W. T. Robertson, railroad contractor. He states that his forces have graded the line to the City of Cuatro Ciénegas, 80 miles and within the last few weeks have carried the work of grading 30 miles beyond into a mountain gap called Puerto de Jora. Here grading has stopped pending orders from headquarters. A party of engineers is now at work locating the remainder of the line from Puerto de Jora to Sierra Mojada. No track-laying has been done, save at Monclovia, but ties and rails for about fifty miles have been delivered. Mr. Robertson expects to begin the active work of laying the track in March. The entire distance into Sierra Mojada will also be graded, and by next July the contractor hopes to run locomotives into the mining town of Sierra Mojada. The extension will open a fine region. For thirty miles toward Cuatro Ciénegas, along the Salado River, are vast plantations or haciendas. Then comes the rich fruit country of Cuatro Ciénegas, which is also the shipping point for a number of valuable mines. After leaving Cuatro Ciénegas the road traverses a desert stretch until it reaches the fertile and sheltered spots in the heart of the Sierra Mojada mountains. The terminus, Sierra Mojada, is one of the most thriving places in Northern Mexico.

Millbury, Sutton & Douglas.—A bill to grant this company a charter, with Thomas M. Babson and others as incorporators, is now pending in the Massachusetts Legislature.

Mountford Colonization.—Grading has been completed for eight miles, and it is expected that by June next 10 miles will be in operation from St. Sauveur, Que., on the Montreal & Western, 10 miles south to Morin Flats, in the County of Terrebonne. The old directors have been re-elected as follows: F. Senecal, Ald. Jos. Brunet, Godfroi Chapeau, F. Froidevaux and John D. Porcheron. E. Senecal is President and John D. Porcheron Vice-President.

Nevada Southern.—The first 30 miles of this road from

Goffs, west of The Needles, Cal., will probably be completed early next month. This will bring the line to the New York mining district, which it was expected to reach by Feb. 1. Some track has already been laid from Goffs, but the work has been delayed owing to the non-delivery of construction material. Water and all supplies are brought from The Needles, there being no water between that place and the New York mining district. J. E. Blake, of Denver, is President, and R. S. Seibert is General Manager.

New Jersey & New York.—Arrangements have been made to build a second track from the connection with the New York, Lake Erie & Western east of Rutherford, north to Hillsdale, N. J., a distance of 17 miles, and a force of men will begin work on the improvement as soon as the weather permits. There is little excavating to do, and in many places the ground is already prepared for the second track, so that the double track will be in use early in the summer.

New Roads.—Bills to incorporate the Black River and the Osage Valley railroad companies have been introduced at the present session of the New Hampshire Legislature.

A meeting was held at Skowhegan, Me., last week in the interest of the proposed road from Skowhegan to Moosehead Lake. The route selected runs through Athens, Brighton, Mayfield, Kingfield, Abbot, Monson and Greenville. A. C. S. Hall and J. F. Holman, of Athens, have asked Skowhegan to vote a \$200,000 subsidy for the line, which it is not supposed will be done.

Niagara & St. Mary's River.—This company is applying to the Ontario Legislature for a charter to build a road from a point on the Niagara River to the river St. Mary, in the District of Algoma, Ont., near the town of Sault Ste. Marie.

North Carolina Road.—Application has been made to the state legislature for a charter for a road from Sanford to Smithfield by way of Moore, Harnett and Johnston counties.

Ohio River.—This company is pushing its Huntington & Big Sandy division, between Huntington and Kenova, W. Va., with vigor, and the gap will probably be closed up and the line opened for traffic in about 10 days. This will connect the Ohio River road with the Norfolk & Western by the Kenova Belt Line, and will change the actual terminus of the Ohio River road from Huntington to Kenova.

Ontario.—Application has been made to the Ontario Legislature for a charter to build a line from Toronto, northerly, keeping to the east of Lake Simcoe, through the town of Gravenhurst, and Parry Sound, to French River, and westerly to connect with the Canadian Pacific near Spanish River; also from French River, northerly, to the town of Sudbury, Ont.

Pittsburgh, Cincinnati, Chicago & St. Louis.—This company has its double track completed between Jewett and Miller Station, O., six miles, and will have it ballasted and in use in 60 days. The grading between Jewett and Bowerston, O., 12 miles, is done, but the rails have not arrived. This work will be finished in 90 days, and then the double track on that section will extend from Denison, O. to Miller, 20 miles. From Miller east to Skelly's there are two tunnels and several bridges, but the bridges are stone arches wide enough for double track. It is thought the double track can be extended to Skelly's, except through the tunnels, as soon as it is finished to Stubenville, O. There will be two or more long passing sidings at Gould's, Skelly's, Miller, Jewett and Bowerston.

Philadelphia, Honesdale & Albany.—The preliminary survey for this line was commenced last week by two parties of engineers, one starting at Honesdale, Pa., and going south and the second working in a northerly direction toward White Haven, Pa. The Chief Engineer, F. F. Whitteken, is organizing two additional parties of engineers for the survey. The route for the proposed road is not given very definitely in the accounts that have reached us, but the surveys now being made will be run as far south as Albany, Pa. Surveys will also be made north of Honesdale, and the total length of the projected line will be about 160 miles.

Philadelphia & Reading.—Vice-President R. H. Sayre met at Reading, Pa., this week, citizens from Bernice, Pa., who want a branch built to that town, 15 miles northwest of Reading. The survey will be made shortly. It is said that the company has agreed to build the first four miles from Reading if sufficient stock to build the balance is subscribed. This part of the road can be easily constructed, as it is along a towpath of an old canal.

Philadelphia, Wilmington & Baltimore.—The surveys for the second track between Media and Lenni, Pa., a distance of 3½ miles have been made, and an estimate prepared of the cost of the same, and it is expected that a part of the work will be authorized this spring. The large bridge over Ridley Creek just west of Media will have to be double-tracked. This bridge is 637 ft. long and 104 ft. above the water. The item printed last week about this work was misleading. A neat passenger station has just been completed at Kennett, 34 miles from Philadelphia, on this division. The iron viaduct at Burmont, seven miles from Philadelphia, which takes the place of the old Howe truss over Darby Creek, will be ready for use in about two weeks.

Rice Lake, Dallas & Menominee.—This company has been organized with headquarters at Rice Lake, Wis., and with a capital of \$2,000,000. The proposed line is from Menominee to Rice Lake, passing through Dallas. The following are the officers and directors: S. C. Olmstead, St. Paul, President and General Solicitor; H. E. Clark, St. Paul, Vice-President and Chief Engineer; J. E. Horsman, Rice Lake, Secretary and Treasurer; directors: S. C. Olmstead, D. W. White, John A. Johnson and H. E. Clark, St. Paul, and J. E. Horsman, Rice Lake.

Rockaway Valley.—Arrangements are being made to begin work shortly on the line into Morristown, N. J., three-fourths of a mile beyond the present terminus. A branch will also be run to the State Insane Asylum at Morris Plains, N. J., two miles.

St. Louis, Chicago & St. Paul.—The construction work on the new line between Bates and Springfield, Ill., is still continued by the contractors, and some track has been laid this year. The new line will be about thirteen miles long, and there are still 10 miles of track to build. The company expects, however, to be running trains into Springfield over its own line early in April unless the work is delayed by unfavorable weather.

St. Louis, Collinsville & Eastern.—This company filed articles of incorporation in Illinois last week. It is proposed to build a road from East St. Louis to Collinsville, with a branch to Venice. The capital stock is \$250,000. The incorporators and first Board of Directors are: Alexander Young, Walter Young, St. Joseph; James Hannerty, Chicago; John S. P. Gordon, Collinsville, Ill., and Perry A. Gordon, Glen Carbon, Ill.

Saylor Springs.—A charter for this company, which proposes to build a railroad between Clay City and Saylor Springs, Ill., about 10 miles, was granted in Illinois last week. The incorporators are Nathaniel W. Burns and M. Dawsey, of Clay City, Ill.

Superior-Duluth Terminal & Transfer Co.—Articles of incorporation of the company will be filed in Wisconsin in a few days. The incorporators are Day K. Smith and A. Harrington, of the Duluth Transfer Railroad, and H. H. McIntyre, of the South Superior Improvement Co. All the stock of the new company will be held by the Duluth Transfer Company, and the new charter has been secured to build a branch of that road to Superior, Wis. A bill is now before Congress to authorize the company to build a bridge between Grassy Point and Superior.

Tampa & Thonotassassa.—Silas A. Jones, Harvey J. Cooper and Harry L. Branch, of Tampa, Fla., have incorporated this company to construct a road from Tampa to a point near Thonotassassa Lake in Hillsboro County. The capital stock is \$120,000.

Texarkana & Fort Smith.—Pres. W. L. Whitaker of Texarkana, Tex., states that he has received a proposition from the Board of Trade at Shreveport, La., in regard to the proposed southern extension of this road from Texarkana. It is now under consideration. Construction has already begun on the northern end from Wilton, Ark. The report that the road has been purchased by the capitalists who are building the Kansas City, Pittsburgh & Gulf is confirmed, but President Whitaker says that no changes in the management will be made at present.

Texas Central.—General Manager Charles Hamilton stated last week, it is reported, that the company will build a branch from a point on the main line in Erath County, near Dublin, north to the Texas & Pacific Coal Co.'s mines at Thuber, Tex., 40 miles. He has recently returned from a trip over the line to Thuber in company with Henry K. McHarg, of New York, President of the road. The survey of the line has been completed and its construction will be shortly undertaken.

Texas Midland.—Joseph McWilliams, of Terrell, Tex., Chief Engineer of the road, states that two surveys for the proposed northern extension from Roberts to Paris, Tex., have been completed, one from Roberts via Black Jack Grove to Paris, the other through Greenville to Paris. President E. H. R. Green has offered to construct the road through Greenville if the citizens will give a bonus of \$20,000 and the right of way through Hunt County.

Toledo & Ohio Central.—The company is preparing to begin the construction of the proposed extension to Columbus, O., which has been surveyed several times in the last year or two. Some of the material has already been delivered at Ridgeway, O., which will be the starting point for the new line, but the contracts for the grading have not yet been awarded. The new road will be the extension of the present Western Division, which extends south from Toledo and is in operation to Kenton and Ridgeway. The distance to be built to reach Columbus, O., is 60 miles. The construction work will be in charge of J. T. Williams, of Toledo.

Waco, Mooreville & Austin.—A meeting of representatives along the proposed line of the Waco, Mooreville & Austin road was held at Waco, Tex., and other towns last week, and committees on right of way and subscription to capital stock were appointed. E. F. Rogers, of Waco, has prepared preliminary estimates of the cost of construction. The proposed line is from Waco south through Mooreville to Austin, Tex., about 100 miles. The company has not been organized, but among those interested are S. W. Slayder, M. Surratt and E. Rotan, of Waco, Tex.

Winston, Salem & Charleston.—A bill to incorporate this company has passed the North Carolina Legislature. The road is to extend from Winston-Salem or Charleston through the counties of Davidson, Randolph, Montgomery, Stanley and Anson via Wadesboro, etc.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The following table gives the earnings of the entire Atchison system, including the St. Louis & San Francisco and the Colorado Midland, for December and the six months of the fiscal year:

Month of December.	1892.	1891.	Inc. or dec.
Average operated mileage..	9,344	9,333	I. 6.52
Gross railroad earnings.....	\$4,168,299	\$4,054,679	I. \$113,620
Operating expenses.....	2,955,461	2,768,027	I. 187,434
Net earnings.....	\$1,212,838	\$1,286,652	D. \$73,814
Other receipts.....	75,000	75,000	
Total net earnings.....	\$1,287,838	\$1,361,652	D. \$73,814
One-twelfth annual fixed charges (est).....	1,194,000	1,192,000	I. 2,000
Surplus.....	\$93,838	\$169,652	D. \$75,814

Six months, July 1, 1892, to Dec. 31, 1892.

Month of December.	1892.	1891.	Inc.
Average operated mileage..	9,344	9,333	9
Gross railroad earnings.....	\$26,919,129	\$25,384,996	\$1,534,132
Operating expenses.....	17,654,614	16,585,854	1,068,730
Net earnings.....	\$9,264,514	\$8,799,112	\$465,402
Other receipts (est).....	450,000	450,000	
Total net earnings.....	\$9,714,514	\$9,249,111	\$465,403
Six-twelfths annual fixed charges (est).....	7,164,000	7,152,000	12,000
Surplus.....	\$2,550,514	\$2,097,111	\$453,403

Cleveland, Cincinnati, Chicago & St. Louis.—The financial statement for December is as follows:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$1,306,208	\$1,338,899	D. \$32,691
Oper. expen.....	902,120	913,212	D. 11,092
Net earn.....	\$398,088	\$395,687	I. 2,401
Fixed charges.....	226,983	235,642	D. 8,659
Surplus.....	\$171,105	\$160,045	I. \$11,060

For six months to Dec. 31:

Gross earn.....	\$7,966,120	\$7,745,055	I. \$221,065
Oper. expen.....	5,879,321	5,366,033	I. 513,288
Net earn.....	\$2,116,799	\$2,379,022	D. \$262,223
Fixed charges.....	1,328,455	1,370,342	D. 41,887
Surplus.....	\$788,344	\$1,008,680	D. \$220,336

Dover & Statesboro.—The company having defaulted in payment of interest on its bonds, Marion Irwin has been appointed temporary receiver, on petition of the Commercial Bank of Augusta and R. W. Inman, of New York. The road is a 10-mile line extending from Dover, on the Central of Georgia, in Screven County, to Statesboro, in Bullock County, Ga., and was built by citizens of those places and bonded for \$50,000.

Great Northern.—The statement of earnings for the month of January is published below:

	1893.	1892.	Inc. or dec.
St. P., M. & M. leased lines	\$868,731	\$798,945	I. \$69,786
Eastern Ry. of Minn.....	101,437	82,082	I. 19,355
Montana Central.....	93,984	97,074	D. 3,090
Total for system.....	\$1,064,152	\$978,101	I. \$86,051

Seven months, July 1 to Jan. 31:

St. P., M. & M. leased lines	\$8,950,578	\$8,201,346	I. \$749,232
Eastern Ry. of Minn.....	942,832	826,265	I. 116,567
Montana Central.....	717,769	757,370	D. 39,601
Total for system.....	\$10,611,179	\$9,784,981	I. \$826,198

Manhattan (Elevated).—Justice Ingraham, of the New York Supreme Court, this week decided against the company the suit of the city of New York to compel the company to pay to the city five per cent. of its net earnings. The period covered is from 1880 to 1890. Justice Ingraham also decided that the city is not liable to the company for the money the latter has paid to property owners as damages to their property by the building of the elevated road.

Northern Pacific.—The earnings for the six months to Dec. 31, including the Wisconsin Central lines, are given in the following table:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$17,447,927	\$17,153,104	I. \$294,823
Oper. expen.....	9,718,330	9,625,772	I. 92,558
Net earn.....	\$7,729,597	\$7,527,332	I. \$202,265
Surplus for stock.....	1,497,365	1,852,859	D. 355,494

New York, New Haven & Hartford.—A resolution was introduced in the Connecticut Legislature this week authorizing an increase of the capital stock of the railroad from the present amount of \$50,500,000 to \$100,000,000. The Railroad Commissioners have made a report on the matter, recommending that the authority to increase the capital stock be granted.

Pan American.—The property of this Texas road was to have been sold at Victoria, Tex., Feb. 7, but an agreement was made with the creditors before that day, and the sale did not take place. The track is now laid for 10 miles south of Victoria, to the Guadalupe River, and it is proposed to begin running trains to that point soon.

Philadelphia & Erie.—At the annual meeting of the stockholders at Philadelphia, Feb. 12, it was resolved that the incoming Board of Directors be requested to secure an exchange of the present outstanding stock of the road, amounting to \$4,500,000, for Pennsylvania Railroad stock, par for par. It was also resolved to request a cash dividend of three per cent. and a scrip dividend of two per cent.

Rogue River Valley.—This road, which is now in operation only between Medford and Jacksonville, Or., six miles, has been sold by the owners, Honeyman & De Hart, to C. H. Leadbetter, who is interested in the Kennewick irrigation canal. C. H. Leadbetter has been elected President, and his son, F. W. Leadbetter, General Manager. It is the intention of the purchaser to extend the road at an early day some 25 miles east into the sugar-pine forests at the headwaters of the Rogue and Butte rivers.

San Antonio & Aransas Pass.—The modified reorganization plan and agreement of Dec. 14, 1892, have been assented to by all the depositors. Arrangements have been made with three banking houses to form a guarantee syndicate for \$5,925,830 of new four per cent. 50-year bonds, which are to be sold to meet cash requirements. Both principal and interest on these bonds are to be guaranteed by the Southern Pacific Company.

Waco, Lampas & Llano.—The franchise of this road, which is graded for about 17 miles from Lampasas, Tex., was sold by the sheriff at Llano, Tex., Feb. 9, to W. B. Dorland.

Wheeling Bridge & Terminal.—Several months ago the Cleveland, Lorain & Wheeling began running its through passenger trains for Cleveland and Chicago from the Union station in Wheeling, W. Va. On last Tuesday this company began using the Terminal tracks for all its trains and made Wheeling its actual terminus for all freight and passenger traffic. Heretofore, passengers for Wheeling have been transferred by street cars from Bridgeport, O., by way of Wheeling Island and freight has been carried by barge across the river. The old transfer steamer will continue to deliver ore and similar heavy freight to furnaces and mills on the river front. Forty passenger trains a day now cross the Terminal company's bridge and transfer tracks.

TRAFFIC.

Traffic Notes.

The Boston & Maine has put on a passenger train to run between Boston and Portland, 108 miles, in 3 hours.

The through freight of the Wabash road to and from the Grand Trunk is to be run through the St. Clair tunnel instead of going across the river by ferry at Detroit as heretofore.

A Texas paper reports that a through vestibule train will be run from Galveston to Chicago after March 1. The train will run over the International & Great Northern, the Texas & Pacific, the St. Louis, Iron Mountain & Southern and the Chicago & Alton.

Philadelphia papers state that the congested condition of the anthracite coal trade has been relieved. Tidewater shipments have been resumed from New York harbor, but the greater part of the coal now going to New England is being shipped all-rail.

The passenger agent of the Lake Shore & Michigan Southern at Toledo has sent out to the patrons of the road reply-postal-cards asking opinions as to the best hours for running excursion trains to the World's Fair. Toledo is a point from which some one-day excursions can probably be run to Chicago, and the answer to this

inquiry will be interesting; but it would be difficult in most cities to decide who among the "patrons" of a road would have opinions worth considering on such a question.

Chicago Traffic Matters.

CHICAGO, Feb. 15, 1893.

The committee of the Western Passenger Association will complete the proposed new aqueduct on Friday, and it will be submitted to a general meeting of the association for consideration and approval next week.

Chairman Midgley has been delegated by the Western lines to go to Washington and ask for an explanation of the decision of the Interstate Commerce Commission's decision in the matter of grain rates to Minneapolis and Duluth. Incidentally, he will petition the Commission for a modification of the order on the ground that the difference of three cents between Minneapolis and Duluth is too great. The Northern Pacific has always maintained that Duluth should take the same rate as Minneapolis. It is quite probable that the Northern Pacific will not be inclined now to yield this point.

Western officials who were in attendance at the meeting of the Joint Committee in New York last week state that the general result of the meeting was encouraging, although there are several questions of difference in regard to eastbound business which the Commissioners have not yet had sufficient time to fully harmonize.

The Transcontinental lines held a meeting here this week to consider rates for the World's Fair. As I stated several weeks ago, it is quite certain that the rate from the Pacific Coast will not exceed fare one way, a rate of a fare and one-third being adopted for points east of the Missouri River.

Chairman Caldwell has authorized all Association roads to sell tickets in the Minneapolis hotels to meet the competition of the "Soo" Line.

It is reported that the Lake Superior Transit Company has abandoned its passenger business and requests all railroads to withdraw its tickets from sale.

The shipments of eastbound freight, not including livestock, from Chicago, by all the lines for the week ending Feb. 11 amounted to 71,333 tons, against 78,615 tons during the preceding week, a decrease of 7,282 tons, and against 98,808 tons during the corresponding week of 1892. The proportions carried by each road were:

Roads.	W'k to Feb. 11.		W'k to Feb. 4.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	9,177	12.9	9,413	12.
Wabash.....	5,342	9.6	6,591	8.4
Lake Shore & Michigan South.	16,237	22.8	16,533	21.
Pitts., Ft. Wayne & Chicago..	6,627	9.3	9,616	12.2
Pitts., Cin., Chicago & St. Louis	5,117	7.2	7,937	10.1
Baltimore & Ohio.....	5,594	7.8	5,336	6.8
Chicago & Grand Trunk.....	6,627	9.3	6,898	8.8
New York, Chic. & St. Louis..	4,218	5.9	4,274	5.4
Chicago & Erie.....	8,521	11.9	9,379	11.9
C., C. & St. Louis.....	2,373	3.3	2,638	3.4
Totals.....	71,333	100.0	78,605	100.0

Of the above shipments 7,962 tons were flour, 37,839 tons grain and millstuff, 7,699 tons cured meats, 11,365 tons dressed beef, 1,831 tons hides, and 1,896 tons lumber. The three Vanderbilt lines carried 41.6 per cent., the two Pennsylvania lines 1.65 per cent.

Cut Rate Tickets on the Trunk Lines.

Last week we printed a communication from a man who bought reduced rate tickets between New York and Chicago with great facility. The circumstances which make this possible are made somewhat clearer by the following explanation, published at Chicago as coming from a prominent traffic manager who attended a recent meeting in New York:

"The conference was entirely barren of results, just as I predicted it would be. Everything was referred back to the Board of Presidents. The only question discussed was that relating to the abolition of commissions on passenger traffic. It was held that some of the differential lines are paying commissions to secure business."

"That sounded very well, but it transpired that, while the rates from New York to Chicago by the differential lines varied only from \$17.50 to \$18.50, there was a rate in force by way of the New York Central and other trunk lines, in connection with the Nickel-Plate, of \$14, thus more than wiping out the differential. Of course nobody accused the trunk lines of participating in the reduction, but that they winked at it was too evident to be denied. It was said that the tickets from New York to Buffalo were bought up and sold in connection with \$6 tickets over the Nickel-Plate from Buffalo to Chicago. Furthermore, it was discovered that brokers were dealing in these tickets at a profit to themselves, which is an indication that the Nickel-Plate rate is less than \$6."

"On eastbound business the conditions are the same. The rate from Chicago to Buffalo over the Nickel-Plate is \$6, which, added to an \$8 rate over the West Shore to New York, makes the through rate \$14. Sometimes you can even get a discount on this from scalpers. We are told that the Nickel-Plate is at a great disadvantage because it has no through passenger service time. That is a mistake. The company has recently improved its passenger service. It is now running a through vestibuled train, and making even better time than some of the roads that have been trying to be content with their authorized differential rates."

"There can be no doubt that commissions are paid on the sale of those \$14 tickets between Chicago and New York, because the scalpers are selling them and they undoubtedly get a profit out of them."

Trans-Continental Rates.

The trans-continental lines have held a conference at St. Paul which lasted six weeks and they have now announced the following reductions in freight rates. The new rates apply to all the territory west of Chicago where the Union Pacific, the Northern Pacific and the Great Northern compete. Many of the reductions are important as will be seen by these figures: From St. Paul to North Pacific coast points, first class, reduced from \$3.50 to \$3.00 per 100 lbs.; from St. Paul to Spokane, \$3.50 to \$2.60; St. Paul to Helena and Butte, \$2.50 to \$2.35. Eastbound rates are unchanged except for lumber, which is reduced from 55 cents to 50, Pacific coast points to St. Paul. These reductions are greater than has heretofore been announced, but the present figures seem to be authentic. The rates from Omaha and other Missouri River points to the northern points named are 20 cents higher (first class) than from St. Paul, and from Chicago they are 40 cents higher. The other classes and the commodity rates are reduced in about the same proportion.